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TECHNICAL INSPECTION REPORT

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By Authority of JOINT CHIEFS OF STAFF JCS 1795/36 DATED 15 APRIL 1949
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U.S.S. MAYRANT (DD 402)

TEST BAKER

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~~OPERATION CROSSROADS~~

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TEST BAKER [U]. (8)

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APPROVED:

F.X. Forest,
Captain, U.S.N.

SECRET

~~USS MAYRANT~~ (DD402)

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GROUP-3 1 JAN 1965
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U.S.S. MAYRANT (DD402)

SHIP CHARACTERISTICS

Building Yard: Boston Naval Shipyard

Commissioned: 19 September 1939.

HULL

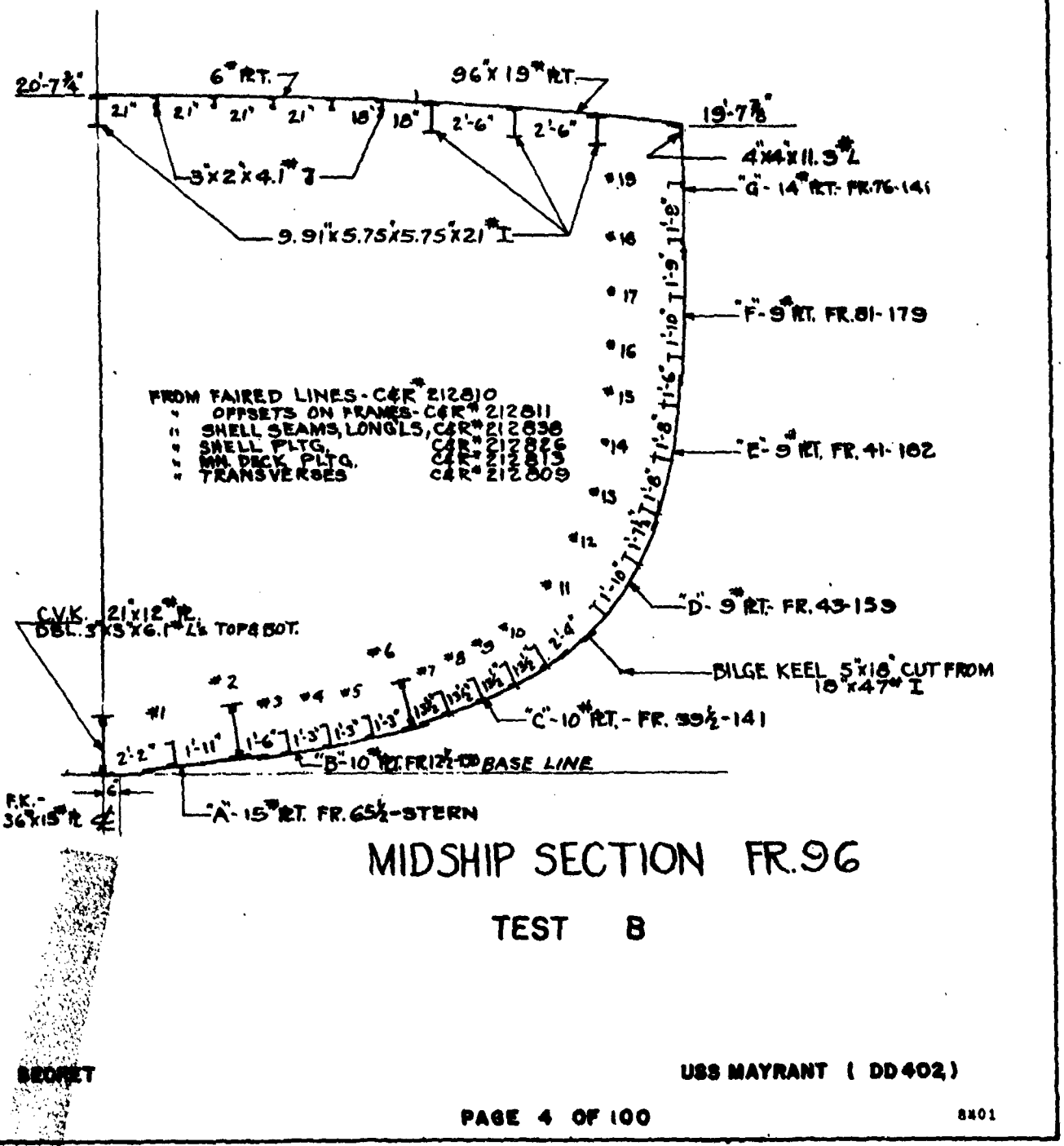
Length Overall: 340 feet 9 inches.
Length on Waterline: 334 feet 0 inches.
Beam (extreme): 35 feet 6 inches.
Depth (molded at side, to main deck, amidships): 19 feet 7 7/8 inches.
Drafts at time of test: Fwd: 12 feet 6 inches.
Aft: 12 feet 6 inches.
Standard Displacement: 1,500 tons.
Displacement at time of test: 2,160 tons.

MAIN PROPULSION PLANT

Main Engines: Two sets of Westinghouse turbines, are installed, one set per shaft.
Reduction Gears: Two sets of double reduction De-Laval are installed. One per turb. set.
Main Condensers: Two are installed in ship.
Boilers: Three Babcock and Wilscox boilers are installed. 565 psi gauge - 705° F.
Propellers: Two are installed.
Main shafts: Two are installed.
Ships Service Generators: Four units are installed two 200 K.W. - A.C., and two 40 D.W. D.C. sets.

LONGL" 1 - 9"x 2 13/16" x 13.4" C
" "2 - 19 1/4" x 7" RT. - 3"x 2"x 4.1" L
" "3-4-5- 8"x 2 5/8" x 11.5" C
" "6 - 17"x 7" RT & 3"x 2"x 4.1" L
" " 7-8-9-10 - 8"x 2 1/4" x 11.5" C
" "11-12-13-14 - 6"x 3.06"x 5.87" Ts
" "15-16-17 - 5"x 2.69"x 4.48" Ts
" "18-19 - 5"x 1 3/4"x 1 1/4"x 6.7" C

7.65" WEB SPCD - 7'-0"
KEEL & KT. SPCD. - EVERY FRAME



FROM FAIRED LINES - C&R" 212810
" OFFSETS ON FRAMES - C&R" 212811
" SHELL SEAMS, LONGLS, C&R" 212838
" SHELL PLTG. C&R" 212826
" MN. DECK PLTG. C&R" 212813
" TRANSVERSES C&R" 212809

MIDSHIP SECTION FR. 96

TEST B

TECHNICAL INSPECTION REPORT

OVERALL SUMMARY

I. Target Condition After Test.

(a) Drafts after test; list; general areas of flooding, sources.

Before test drafts: Forward 12′ 6″; Aft 12′ 6″; 1/2° list starboard. After test drafts: Forward 12′ 6″; aft 13′ 0″; 3° list starboard.

The after engineroom flooded to the outside water line, about one foot above the upper grating level through a broken nipple (previously sealed with a wooden plug, which blew out in test B) in a 3/4 inch cooling waterline to the stern tube, through opened petcocks from four fresh water tanks, through the stern tubes, and through valve packing glands. The forward engineroom flooded to the outside waterline at the upper grating level through a broken salt water line to a lubricating oil cooler and as the result of progressive flooding from the after engineroom through the shaft bulkhead gland. The increase in list was caused by the draining of the fresh water tanks, the shifting of liquid in the forward fuel oil tanks, and the displacement of projectiles in the magazines to starboard.

(b) Structural damage.

HULL

The principal damage was sustained by bulkheads, stanchions, and miscellaneous fittings and equipment in the superstructure. All weather doors and door frames are dished from two to four inches. Some damage was sustained by the shell plating on the starboard side amidships. From the comparatively local nature of this damage it appears that it was sustained as the result of contact with tugs during the process of radiological decontamination.

MACHINERY

The breechings between the stack and uptakes (above the main deck) are considerably dished on both sides. Welds at the lap joints failed and the sheets are parted in places.

ELECTRICAL

Structural damage generally was confined to the superstructure side plating, dishing of doors and starboard shell. The duct to the No. 3 port use forced draft blower in after fire room was ruptured at the section immediately below the fan outlet, however, there was no adverse effects to the motor or impeller and from visual inspection appears to be operable.

(c) Other damage.

HULL

The operability of hull equipment is apparently unaffected.

The main machinery in the engineroom lower levels is flooded.

Operability of the electrical equipment is impaired primarily because of the flooding of the engine rooms and the damaging of the master gyro compass.

MACHINERY

All machinery below the upper level of both engine rooms is damaged by flooding. There is considerable minor damage throughout the machinery spaces to piping, gages, pumps, #3 port use blower etc. Other damage may exist which could not be found by visual inspection.

ELECTRICAL

1. The main electric plant, distribution switchboards,

panels, and main engine and boiler motor driven auxiliaries were undamaged as a direct result of this test, except for the shearing of the mounting bolts on the No. 2 flushing pump located in the after engine room which may have left this unit out of line. The flooding of the forward and after engine rooms as noted under I (a) (3) rendered operational tests on this equipment impossible, as all motors, controllers and wiring for same located below the upper grating level were grounded.

2. Vital ship control systems except for the master gyro compass, which was damaged and temporarily inoperable, were still intact and from visual inspection appeared to be operable.

3. The fire control signalling and communication systems were still intact and from visual inspection appeared to be operable.

4. All the gun mounts could be operated manually. Operation of the mounts electrically was not accomplished as there was no power available. From close visual inspection the power wiring and equipment was undamaged.

II. Forces Evidenced and Effects Noted.

(a) Heat.

HULL

No evidence.

MACHINERY

No evidence.

ELECTRICAL

None.

(b) Fires and explosions.

HULL

None evidenced.

MACHINERY

No evidence.

ELECTRICAL

None.

(c) Shock.

HULL

Considerable evidence of shock is seen in the disarranging of equipment, the movement of projectiles and depth charges and damage to piping joints and ventilation ducts and closures.

MACHINERY

The MAYRANT received a heavy underwater shock. Evidences include broken piping, broken pipe hangers, deranged gages, two sheared foundation bolts on #2 flushing pump, rupture of the duct of #2 port use forced draft blower, disarrangement of engine room floor plates and grating, etc.

ELECTRICAL

Underwater shock was evidenced throughout the ship. Lockers and their contents were displaced, pipe lines and hangers were fractured and floor gratings were dislodged. The effect of shock on electrical equipment was evidenced by damage to the master gryo compass, dislodgement of a 12'' searchlight from its mounting, breaking of several rough service lamps, failure of mounting bolts for No. 2 flushing pump and dislodgement of emergency diesel generator starting batteries.

(d) Pressure.

HULL

The damage to bulkheads and weather doors in the superstructure resulted from the impingement of water of the inundating wave which followed the blast and/or from air pressure.

MACHINERY

The pressure of the heavy mass of water falling on the vessel is believed to have caused the damage to the uptake breechings.

ELECTRICAL

There was some evidence of a pressure wave in the air, although not sufficient to cause damage to exposed electrical equipment.

(e) Any effects apparently peculiar to the atom bomb.

HULL

Effects peculiar to the atomic bomb are the radioactive water, the water wave, shock wave, and the falling water.

MACHINERY

Shock of this magnitude and the heavy mass of water at this distance from an underwater explosion are apparently peculiar to the atom bomb.

ELECTRICAL

Radioactivity and wave phenomena.

III. Effects of damage.

(a) Effects on machinery and electrical and ship control.

HULL

Machinery and electrical equipment are inoperable. Ship control is inoperable due to the loss of power.

MACHINERY

The main propulsion plant is inoperable because of flooding. It is believed that if the crew had been aboard, the flooding could have been controlled. All machinery appears to be otherwise operable except #3 port use blower, which is not used for underway operation. Some reduction in maximum steaming rate of the boilers would be required by damage to the uptake breechings, reducing maximum speed by about 3 knots. It is estimated that this damage could be repaired by the ship's force within 2 days. Some damage not found by visual inspection may exist.

ELECTRICAL

There was no material damage to the electric plant and its associated auxiliaries. The elements of propulsion and turbo generator plant are presently impaired because of post test flooding of both engine rooms.

Ship control would have been impaired to the extent of the temporary loss of the master gyro compass.

(b) Effects on gunnery and fire control.

HULL

Operation of topside station would have been impaired by personnel casualties, by the damage to the master gyro compass, and by loss of electrical power.

MACHINERY

No comment.

ELECTRICAL

The electrical elements associated with gunnery and fire control were impaired to the extent of the temporary loss of the master gyro compass and minor damage to a fire control communication selector switch, system 49jy.

(c) Effect on watertight integrity and stability.

HULL

When the small piping leaks were stopped there was no further flooding. The watertight integrity and stability were affected negligibly by the test.

MACHINERY

No comment.

ELECTRICAL

The only effects on watertight integrity and stability due to electrical equipment was the transfer of a small amount of water from the after engine room to the forward room through cable stuffing tubes. This was not a direct result of electrical damage, but negligence in failure to blank off these tubes when cables were removed.

(d) Effect on personnel and habitability.

Aside from the effects of radioactivity, personnel would have been injured by shock and by contact with loose equipment. Habitability is reduced by numerous piping leaks and by disarrangement of equipment. These items could be corrected by the ship's force.

MACHINERY

It is not believed that there would have been any personnel casualties below deck. Casualties among exposed personnel would have been high. Habitability was not appreciably affected except for radioactivity, which was very high when the ship was inspected 21 days after test B.

ELECTRICAL

There was little if any electrical damage affecting the habitability of this vessel. All flushing and fresh water pumps, galley equipment, lighting, fans, etc., in crew's berthing and messing spaces were undamaged. Other than the effects of radioactivity which are not known to the observers, some personnel on topside may have been temporarily incapacitated by falling water and metal fragments. Others below decks may have suffered bruises resulting from equipment being dislodged and strewn about by underwater shock.

(e) Effect on fighting efficiency.

HULL

None.

MACHINERY

It the crew had been aboard to control flooding, the effect on fighting efficiency would have been to reduce maximum speed by about 3 knots until damage to the uptake breechings was repaired. It is possible that other damage, not found by visual inspection, would affect military efficiency.

ELECTRICAL

The fighting efficiency of this vessel has been somewhat reduced by loss of gyro input to fire control and radar equipment due to damage sustained by master gyro compass. This loss would have been temporary, however, and is within the capacity of

ship's force to replace in service. Further reduction in fighting efficiency would probably result from the momentary confusion among personnel and possible loss of power and lighting due to tripping of circuit breakers. However, this would be only temporary and in a relatively short time the fighting efficiency would return to normal insofar as vital electrical equipment is concerned.

IV. General Summary.

HULL

This vessel was affected principally by the impingement of the water mass of the inundating wave and by the resulting violent motion of the ship. An underwater shock wave caused minor structural, machinery, and electrical damage. It is believed all flooding could have been controlled by the ship's force.

MACHINERY

The MAYRANT was apparently near the limiting range for serious mechanical damage to vessels of her type during test B.

ELECTRICAL

This vessel was subjected to an underwater shock wave sufficient intensity to cause minor structural and machinery damage. The only damage to vital electrical equipment attributed to the blast was that suffered by the master gyro compass. There is evidence of huge masses of water accompanied by metal fragments falling on decks of this vessel, although no electrical damage resulted from this effect, it is the opinion of the observer that some personnel in topside locations would have been injured.

V. Preliminary Recommendations.

HULL

None.

MACHINERY

None.

ELECTRICAL

The future design of gyro compass equipment especially the master gyro compass should be to obtain a more shock resistant unit. At present they are more vulnerable to shock than any other standard electrical equipment, including automatic telephones and electronic gear.

TECHNICAL INSPECTION REPORT

SECTION I - HULL

I. Target Condition After Test

(a) Drafts after test; listing; general areas of flooding, sources.

	Forward	Aft	List
Before test drafts	12'-6"	12'-6"	1/2° stbd.
After test drafts	12'-6"	13'-0"	3° stbd.

The after engineroom flooded to about one foot above the upper grating level through a broken nipple in a 3/4 inch cooling waterline to the stern tube, through opened petcocks from four fresh water tanks, through the stern tubes, and through valve packing glands. The forward engineroom flooded to the upper grating level through a broken salt water line to a lubricating oil cooler and as the result of progressive flooding from the after engineroom through the shaft bulkhead gland. The increase in list was caused by the draining of the fresh water tanks, the shifting of liquid in the forward fuel oil tanks, and the displacement of projectiles in the magazines to starboard.

(b) Structural damage.

The principal damage was sustained by bulkheads, stanchions, and miscellaneous fittings and equipment in the superstructure. All weather doors and door frames are dished from two to four inches. Some damage was sustained by the shell plating on the starboard side amidships. From the comparatively local nature of this damage it appears that it was sustained as the result of contact with tugs during the process of radiological decontamination.

(c) Other damage.

The operability of hull equipment is apparently unaffected.

The main machinery in the engineroom lower levels is flooded.

Operability of the electrical equipment is impaired primarily because of the flooding of the enginerooms and the damaging of the master gyro compass.

II. Forces Evidenced and Effects Noted.

(a) Heat.

No evidence.

(b) Fires and Explosions.

None evidenced.

(c) Shock.

Considerable evidence of shock is seen in the disarranging of equipment, the movement of projectiles and depth charges and damage to piping joints and ventilation ducts and closures.

(d) Pressure.

The damage to bulkheads and weather doors in the superstructure resulted from the impingement of water of the inundating wave which followed the blast and/or from air pressure.

(e) Any effect apparently peculiar to the atom bomb.

Effects peculiar to the atomic bomb are the radioactive water, the water wave, shock wave, and the falling water.

III. Effects of Damage.

(a) Effects on machinery, electrical and ship control.

Machinery and electrical equipment are inoperable. Ship control is inoperable due to the loss of power.

(b) Effects on gunnery and fire control.

Operation of topside stations would have been impaired by personnel casualties, by the damage to the master gyro compass, and by loss of electrical power.

(c) Effect on watertight integrity and stability.

When the small piping leaks were stopped there was no further flooding. The watertight integrity and stability were affected negligibly by the test.

(d) Effect on personnel and habitability.

Aside from the effects of radioactivity, personnel would have been injured by shock and by contact with loose equipment. Habitability is reduced by numerous piping leaks and by disarrangement of equipment. These items could be corrected by the ships force.

IV. General Summary.

This vessel was affected principally by the impingement of the water mass of the inundating wave and by the resulting violent motion of the ship. An underwater shock wave caused minor structural, machinery, and electrical damage. It is believed all flooding could have been controlled by the ships force.

V. Any Preliminary Recommendations.

None.

VI. Instruction for loading the vessel specified the following:

ITEM	LOADING
Fuel oil	50%
Diesel oil	50%
Ammunition	50%
Potable and reserve feed water	Full load
Salt water ballast	160 tons
Gasoline	None.

Details of the actual quantities of the various items aboard are included in Report 7, Stability Inspection Report, submitted by the ship's force in accordance with "Instructions to Target Vessels for Tests and Observations by Ship's Force" issued by the Director of Ships Material. This report is available for inspection in the Bureau of Ships Crossroads Files.

DETAILED DESCRIPTION OF HULL DAMAGE

A. General Description of Hull Damage.

(a) Overall condition of vessel.

In general the overall condition of the vessel as a result of Test B is from fair to good except for radioactivity and flooding. General exterior views are shown on pages 46 to 59 inclusive.

(b & c) General areas of hull damage and causes.

The major damage was apparently caused by shock which broke or jarred loose many items and by the water which damaged the superstructure principally in way of weather tight doors and sides of deck houses. Some of the superstructure damage may have been caused by air blast. A minor amount of damage occurred on the starboard side between frames 68 and 139.

This damage consists principally of minor buckling of a few web frames and of slight dishing of bulkhead 104. The uptakes are also dished and seams parted through rivet failure on both sides. In no case is the damage caused by the blast considered to have impaired the strength of the vessel. General views of damage are shown on page 60 to 70 inclusive.

(d) Principal areas of flooding with sources.

There are two areas severely flooded which increased the draft aft by about one foot. These are the forward engine room, with about 13 feet of water, and the after engine room, with about 14 feet. The forward engineroom flooded apparently through the after bulkhead shaft gland and ruptured salt water piping. The after machinery space flooded from four fresh water tanks and a broken cooling line to the starboard shaft gland in the after bulkhead.

(e) Residual strength, buoyancy and effect of general condition of hull on operability.

No comment can be made on ship control as it was not operated, but from all appearances, it received no damage.

In general from all appearances, except for the high radioactivity and the possibility of a large amount of the crew being washed overboard by the wave of water, little impairment to the fighting efficiency of the vessel is indicated.

B. Superstructure.

(a) Description of damage.

Although the superstructure is the most heavily damaged section, it is in relatively good condition.

The forward face of the deckhouse, from the superstructure deck to the top of the pilot house, is mildly dished. It is cracked at the centerline to about eight feet above the deck. The port diagonal corner from the navigation bridge to the top of the pilot house is dished about two inches and cracked at the center of the panel. The crack extends from the deck to a doubler about four feet above. (Photograph 2177-11, page 60). The port corner of the deck house at frame 57, 02 level is crumpled. (Photograph 2177-10, page 71). In general, brackets in the pilot house are pulled away from longitudinals.

The port and starboard five pound gun bulwarks on the 02 level, are torn loose from the deck at frames 50 and 56. (Photographs 2177-5, page 62, 2177-7, page 63, and 2177-8, page 64). A supporting stanchion at frame 55, port, is pulled free at the forecastle deck and six rivets are missing. A similiar starboard stanchion is lightly pulled from the deck.

The uptakes are badly dished on top about five inches. The port and starboard side seams have failed. (Photograph 4220-12, page 65).

The forward bulkhead of the after deck house is dished (photograph 2177-12, page 66.)

The starboard flagbag, frame 74, was torn loose and is hanging above the walkeay on the forecastle level. The top

of the gear locker, frame 64, port, on the forecastle deck, was knocked off and is lying on deck. Tops of all ready service ammunition boxes are generally bent upwards. Ventilation ducts at frame 58 on the forecastle deck are dished. A blower screen at frame 120, starboard, main deck, is dished and torn.

Handrails on the forward side of the 40mm director station at frame 121 are badly bent. All weather tight doors and their containing panels are dished. (Photographs 2177-4, page). Fittings and equipment throughout the interior are generally scattered.

(b) Cause of damage in each area.

The cause for the above damage is in general attributable to the weight and force of the water wave. But a considerable amount of the damage might have resulted from air pressure.

C. Guns and Directors.

The only damage found in way of any guns, protected or exposed, is the slight dishing of the backs of the shields for numbers one and two 5 inch guns. Gun tubs are damaged as described under Item B.

All mounts, guns, and directors are fully operable by hand, but since no circuits were energized, automatic and mechanical control could not be tested. From outward appearances all of the equipment seems to be in good condition.

D. Torpedo mounts and depth charge gear.

No apparent damage.

E. Weather deck.

No damage.

F. Exterior Hull.

No damage.

G. Interior Compartments (above waterline).

There is no apparent damage to the compartments themselves, but equipment installed therein shows evidence of severe shock and jarring. This was probably caused both by the shock wave and the impact from the wave of water. Any equipment not thoroughly secured is knocked to the deck or otherwise out of place.

Examples of the type of general results of the shock are given below:

1. A light bulb in the main deck passage at frame 38 is broken.

2. A first aid locker is thrown from its rack on bulkhead 29, port side, main deck.

3. Mirrors are knocked from their supports on the bulkhead in the CPO quarters, A103-L.

4. Several projectiles in handling rooms are disarranged, having been thrown from their racks.

H. Armor decks.

Not applicable.

I. Interior Compartments Below the Waterline.

The most serious damage to interior compartments, other than radioactivity, was found in the machinery and boiler spaces. In this area the hull is dished from about 1/2 to 1 1/2 inches between frames 108 to 126. The webs of frames and the edges of transverse bulkheads are crumpled (photographs 2177-1, page 68 , 2177-2, page 69 , and 2177-3, page 70). This general dishing was apparently caused by the severe shock wave. General minor dishing of the shell occurred at frames 68 and 139, all less than 1/2 inch in depth. No other structural damage was found.

Equipment in interior spaces is displaced but is otherwise in good condition other than being well jarred and deranged. The major damage consists of several ruptured salt water lines, of broken glass in gage and dial covers, of broken light bulbs, etc., and of the displacement of numerous floor plates in machinery and boiler spaces. In other spaces the evidence of shock is shown in the breakage of dishes, C02 fire extinguishers knocked from their racks, books out of their shelves in the CPO quarters, and 5'' projectile and powder cans out of their stowages in magazines. Closing plates from the side of the gyro compass are knocked down and strewn on the deck in compartment A-305-3-C.

The crew's mess and the vegetable room have about two inches of water on deck which was permitted by normal seepage from piping.

J. Underwater Hull.

The ship was afloat at the time of inspection and the underwater hull was not visible. Damage that could be seen inside is discussed in Item I.

K. Tanks.

No inspection could be made of tanks except the peak tank which is dry.

L. The principal sources of flooding were small broken pipe lines, packing glands on valves, ventilation ducts, and the starboard stern tubes. Secondary causes were shaft glands, electrical stuffing tubes, and petcocks jarred open.

	Forward	Aft	List
Before test drafts	12'-6''	12'-6''	1/2° starboard
After test drafts	12'-6''	13'-0''	3° starboard

The list was caused by shifting of oil in the forward tanks and drainage of the fresh water tanks into the after engineroom.

The forward fireroom had six inches of water in the bilges from normal seepage. The forward engineroom was flooded to the upper grating level from a broken 3/8 inch salt water re-circulating line and by flooding from the after engineroom through shaft glands and electrical stuffing tubes. The after engineroom flooded to one foot above the upper grating level from a broken 3/4 inch cooling line to the starboard shaft gland in the after bulkhead, from the fresh water tanks B-8, B-10, B-12, and B-13 which drained through petcocks jarred open by shock, and slight leakage from packing glands on the main condenser flapper and overboard gate valves and a small pinhole leak in the shell at frame 124.

The following compartments, A-205-L, A-206-E, and A-305-2A had one or two inches of water on deck from unknown sources but which may have come through the ventilation systems as a result of washing down.

The Division Commander's and Captains Cabin had 2 or 3 inches of highly radioactive water which came through the ventilation systems.

Fuel oil tanks A-2-F, A-3-F, A-4-F, A-5-F, A-6-F, and A-8-F had transfer of fuel between themselves. These boundaries were not oil tight previously.

All flooding could have been controlled by ships company.

M. Ventilation.

A vent blower at frame 92, port, sheared its riveted connection to the duct. Some water entered through previously damaged ducts in the Division Commanders and Captains Cabins.

N. Ship Control.

There is no visible damage, however none of the equipment was operated.

O. Fire Control.

No visible damage.

P. Ammunition Behavior.

Normal.

Q. Ammunition Handling.

No visible damage.

R. Strength.

There is no impairment to the strength of the vessel.

S. Miscellaneous.

The ship is highly radioactive.

TECHNICAL INSPECTION REPORT

SECTION II - MACHINERY

GENERAL SUMMARY OF MACHINERY DAMAGE

I. Target Condition After Test.

(a) Drafts after test; list; general areas of flooding, sources.

Both engine rooms were flooded to the outside water line. Water entered through the following known sources: (1) Both shaft glands. (2) An old rupture in a cooling line in the after engine room. This hole had been sealed with a wooden plug, which blew out during Test B. (3) Leakage through the gland of the after main injection valve. It is believed that the flooding could have been controlled if the crew had been aboard.

(b) Structural damage.

The breechings between the stack and uptakes (above the main deck) are considerable dished on both sides. Welds at the lap joints failed and the sheets are parted in places.

(c) Other damage.

All machinery below the upper level of both engine rooms is damaged by flooding. There is considerable minor damage throughout the machinery spaces to piping, gages, pumps, #3 port use blower, etc.. Other damage may exist which could not be found by visual inspection.

NOTE: Because of high radioactivity, it was not practicable to operate any of the machinery of this vessel or to open it for interior inspection after Test B.

II. Forces Evidenced and Effects Noted.

(a) Heat.

No evidence.

(b) Fires and explosions.

No evidence.

(c) Shock.

The MAYRANT received a heavy underwater shock. Evidences include broken piping, broken pipe hangers, deranged gages, two sheared foundation bolts on #2 flushing pump, rupture of the duct of #3 port use forced draft blower, disarrangement of engine room floor plates and grating, etc..

(d) Pressure.

The pressure of the heavy mass of water falling on the vessel is believed to have caused the damage to the uptake breechings.

(e) Effects apparently peculiar to the atom bomb.

Shock of this magnitude and the heavy mass of water at this distance from an underwater explosion are apparently peculiar to the atom bomb.

III. Effects of Damage.

(a) Effect on machinery and ship control.

The main propulsion plant is inoperable because of flooding. It is believed that if the crew had been aboard, the flooding could have been controlled. All machinery appears to be otherwise operable except #3 port use blower, which is not used for underway

operation. Some reduction in maximum steaming rate of the boilers would be required by damage to the uptake breechings, reducing maximum speed by about 3 knots. It is estimated that this damage could be repaired by the ship's force within 2 days. Some damage not found by visual inspection may exist.

(b) Effect on gunnery and fire control.

No comment.

(c) Effect on water-tight integrity and stability.

No comment.

(d) Effect on personnel and habitability.

It is not believed that there would have been any personnel casualties below deck. Casualties among exposed personnel would have been high. Habitability was not appreciably affected except for radioactivity, which was very high when the ship was inspected 21 days after Test B.

(e) Total effect on fighting efficiency.

If the crew had been aboard to control flooding, the effect on fighting efficiency would have been to reduce maximum speed by about 3 knots until damage to the uptake breechings was repaired. It is possible that other damage, not found by visual inspection, would affect military efficiency.

IV. General Summary.

The MAYRANT was apparently near the limiting range for serious mechanical damage to vessels of her type during Test B.

V. Preliminary Recommendation.

None.

DETAILED DESCRIPTION OF MACHINERY DAMAGE

A. General Description of Machinery Damage.

(a) Overall condition.

Both engine rooms were flooded to the outside water line. Water is known to have entered from the following: (1) Leakage through shaft glands. Both glands appear to have been loosened and backed off slightly. (2) An old rupture in the port side main shaft gland cooling water line, frame 135. This hole had been sealed with a wooden plug which blew out during Test B. (3) Leakage through the gland of the after main injection valve. It is believed that all of the flooding could have been controlled if the crew had been aboard. Breeching between uptakes and stack was considerably dished. There is minor damage to pumps, piping, etc., and possibly other damage that could not be found by visual inspection.

(b) Areas of major damage.

Both engine rooms were flooded.

(c) Primary cause of damage in each area of major damage.

Shock was the primary cause of the flooding, and of all damage below decks. Damage to the uptake breechings (above the main deck) is believed to have been caused by the heavy mass of water which fell on the ship after the shot.

(d) Effect of target test on overall operation of machinery plant.

The main propulsion plant is inoperable because of flooding. If the crew had been aboard, this flooding could have been controlled. In that case, damage to the uptake breechings would have reduced the maximum steaming rate of the boilers, causing a reduction in maximum speed of about 3 knots. No other damage found by visual inspection would affect overall operation of the machinery. It is possible that some damage exists that could not be found by visual inspection.

B. Boilers.

The boilers themselves appear to be undamaged. Fittings are intact, brickwork is undamaged. The foundations could not be inspected closely but appear to be intact.

The breeching between stacks and uptakes (above the main deck) are dished in considerably on both sides. Failures occurred at the lap joints where the sheets are welded together. The transition piece between the stack and the breeching is slightly distorted on the starboard side. (Photos 4220-12-4221-1, 2, 3; pages 65, 71, 72, and 73), show the damage.

The stack is undamaged.

This damage would not prevent steaming of the boilers but would require some reduction in maximum steaming rate.

This damage was apparently caused by the heavy mass of water falling on the vessel after the explosion.

C. Blowers.

No damage to main forced draft blowers was found by visual inspection. The duct of the port use blower for #3 boiler was ruptured in the section immediately below the fan outlet. This apparently was caused by relative motion between the fan and the boiler casing, although no other evidence of motion was observed here. This duct appears to have no expansion joints between the blower and the boiler casing and therefore motion between the two stressed the duct and resulted in its failure (See photo 4221-4, page 74). This blower could not be operated until the duct was repaired, however, it had no effect on operation of the boiler as main blowers could be used.

D. Fuel Oil Equipment.

No damage to fuel oil equipment was found by visual inspection.

E. Boiler Feedwater Equipment.

No damage to boiler feedwater equipment was found by visual inspection.

F. Main Propulsion Machinery.

No damage to main engines was found by visual inspection except that incident to flooding.

G. Reduction Gears.

No apparent damage except for effects of flooding.

H. Shafting and Bearings.

The shafting and bearings were inspected and appear to be undamaged. Leakage through the shaft gland at bulkhead 118, caused flooding of the forward engine room and flooding through the shaft glands at bulkhead 135 contributed to the flooding of the after engine room. The gland stuffing boxes appear to have been loosened and backed off slightly by the shock incident to Test B.

I. Lubrication System.

No apparent damage except that incident to flooding.

J. Condensers and Air Ejectors.

No apparent damage except that incident to flooding.

K. Pumps.

All pumps were examined and appear to be undamaged except for effects of flooding. However, two of the foundation bolts of #2 flushing pump were sheared off which indicates that the pumps were subjected to considerable shock. This pump may be out of alignment.

L. Auxiliary Generators (Turbines and Gears).

The auxiliary generators were inspected and appear to be undamaged.

M. Propellers.

The propellers were inspected from the surface of the water and appear to be undamaged.

N. Distilling Plant.

The distilling plant was inspected and except for a broken tubular gage glass on the measuring tank and the effects of flooding, appears to be undamaged.

O. Refrigeration Plant.

Apparently undamaged.

P. Winches, Windlasses, and Capstans.

Apparently undamaged.

Q. Steering Engine.

Apparently undamaged.

R. Elevators, Ammunition Hoists, Etc..

Apparently undamaged.

S. Ventilation (Machinery).

Apparently undamaged.

Apparently undamaged.

T. Compressed Air Plant.

Apparently undamaged.

U. Diesels (Generators and Boats).

Apparently undamaged.

V. Piping Systems.

All piping was inspected and appears to be undamaged except as noted below. The piping was not tested.

(a) Main steam.

Two spring hanger straps supporting the 7 inch main steam line on the starboard side of the forward fire room, were sheared off through the lower bolt holes (see photos 4221-5, 6; pages 75 and 76). One of the strap bolts of the third hanger in this section was also sheared off. Damage to the three hangers has left this section of pipe supported only at the bulkheads. The line could not be examined for further damage due to the insulation of the pipe. Damage was caused by shock.

The after spring hanger strap of the starboard main was sheared off at the lower bolt hole as a result of shock.

(b) Auxiliary steam line.

A failure occurred in the brazed junction of the common exhaust line from the bilge pump and air compressor in the after fire room. Failure was caused by shock.

(c) Salt water cooling line.

A leak developed in an old rupture of the port side main shaft gland cooling water line at bulkhead 135. The hole in this line had been sealed with a wooden plug which vibrated loose during Test B. The untight condition of the cut out valve at the gland permitted water to leak through the ruptured line. Leakage through this line and through the gland of the main injection non-return valve contributed to the flooding of the after engine room.

W. Miscellaneous.

Apparently undamaged. The galley, machine shop, and laundry equipment was visually inspected and showed no evidence of any damage.

TECHNICAL INSPECTION REPORT

SECTION III - ELECTRICAL

GENERAL SUMMARY OF ELECTRICAL DAMAGE

I. Target Condition After Test.

(a) Drafts after test; list; general areas of flooding, sources.

1. Drafts - not observed.

2. List - not observed.

3. Flooding.

The forward engine room was flooded to height of approximately 6" below the upper level. The after engine room was flooded to a height of approximately 1' 0" above the upper level, all of which occurred over a period of 20 days after test and could have been controlled had a crew been onboard.

4. Sources.

The forward engine room was apparently flooded through shaft packing glands and unblanked cable stuffing tubes in the after bulkhead, frame 118.

The after engine room was flooded through shell opening frame 124, and cooling line to starboard shaft gland. Other sources may exist.

(b) Structural damage.

1. Structural damage generally was confined to the superstructure side plating, dishing of doors and starboard shell. The duct to the No. 3 port use forced draft blower in after fire room was ruptured at the section immediately below the fan outlet, however,

there was no adverse effects to the motor or impeller and from visual inspection appears to be operable.

(c) Damage electrical.

1. The main electric plant, distribution switchboards, panels, and main engine and boiler motor driven auxiliaries were undamaged as a direct result of this test, except for the shearing of the mounting bolts on the No. 2 flushing pump located in the after engine room which may have left this unit out of line. The flooding of the forward and after engine rooms as noted under I (a) 3 rendered operational tests on this equipment impossible, as all motors, controllers and wiring for same located below the upper grating level were grounded.

2. Vital ship control systems except for the master gyro compass, which was damaged and temporarily inoperable, were still intact and from visual inspection appeared to be operable.

3. The fire control signalling and communicating systems were still intact and from visual inspection appeared to be operable.

4. All the gun mounts could be operated manually. Operation of the mounts electrically was not accomplished as there was no power available. From close visual inspection the power wiring and equipment was undamaged.

II. Forces Evidenced and Effects Noted.

(a) Heat.

None.

(b) Fires and explosions.

None.

(c) Shock.

Underwater shock was evidenced throughout the ship.

Lockers and their contents were displaced, pipe lines and hangers were fractured and floor gratings dislodged. The effect of shock on electrical equipment was evidenced by damage to the master gyro compass, dislodgement of a 12'' searchlight from its mounting, breaking of several rough service lamps, failure of mounting bolts for No. 2 flushing pump and dislodgement of emergency diesel generator starting batteries.

(d) Pressure.

There was some evidence of a pressure wave in the air, although not sufficient to cause damage to exposed electrical equipment.

(e) Any effects apparently peculiar to the Atom Bomb.

Radioactivity and wave phenomena.

III. Effects of Damage.

(a) Effect on electrical and ship control.

1. There was no material damage to the electric plant and its associated auxiliaries. The elements of propulsion and turbo generator plant are presently impaired because of post test flooding of both engine rooms.

2. Ship control would have been impaired to the extent of the temporary loss of the master gyro compass.

(b) Effect on gunnery and fire control.

The electrical elements associated with gunnery and fire control were impaired to the extent of the temporary loss of the master gyro compass and minor damage to a fire control communication selector switch, system 49JY.

(c) Effect on water-tight integrity and stability.

The only effects on water-tight integrity and stability

due to electrical equipment was the transfer of a small amount of water from the after engine room to the forward room through cable stuffing tubes. This was not a direct result of electrical damage, but negligence in failing to blank off these tubes when cables were removed.

(d) Effect of personnel and habitability.

There was little if any electrical damage affecting the habitability of this vessel. All flushing and fresh water pumps, galley equipment, lighting, fans, etc., in crew's berthing and messing spaces were undamaged. Other than the effects of radioactivity which are not known to the observers, some personnel on topside may have been temporarily incapacitated by falling water and metal fragaments. Others below decks may have suffered bruises resulting from equipment being dislodged and strewn about by underwater shock.

(e) Total effect on fighting efficiency.

The fighting efficiency of this vessel has been somewhat reduced by loss of gyro input to fire control and radar equipment due to damage sustained by master gyro compass. This loss would have been temporary however, and is within the capacity of ship's force to replace in service. Further reduction in fighting efficiency would probably result from the momentary confusion among personnel and possible loss of power and lighting due to tripping of circuit breakers. However, this would be only temporary and in a relatively short time the fighting efficiency would return to normal insofar as vital electrical equipment is concerned.

IV. General Summary of Observers' Impressions and Conclusions.

This vessel was subjected to an underwater shock wave sufficient intensity to cause minor structural and machinery damage. The only damage to vital electrical equipment attributed to the blast was that suffered by the master gyro compass. There is evidence of huge masses of water accompanied by metal fragments falling on decks of this vessel, although no electrical damage resulted from this effect, it is the opinion of the observer that some personnel in topside locations would have been injured.

V. Recommendations.

The future design of gyro compass equipment especially the master gyro compass should be to obtain a more shock resistant unit. At present they are more vulnerable to shock than any other standard electrical equipment, including automatic telephones and electronic gear.

DETAILED DESCRIPTION OF ELECTRICAL DAMAGE

A. General Description of Electrical Damage.

(a) Overall condition.

1. The main and emergency generating plant, distribution switchboards and engine and boiler motor driven auxiliaries appear to have suffered only minor damage as a result of this test.

2. Due to underwater shock the mounting bolts on the No. 2 flushing pump located in the after engine room were sheared leaving this unit probably out of line. The master gyro compass suspension springs were slightly enlongated, and all binnacle ring holding down springs were detached, leaving this unit temporarily inoperable.

3. Post test flooding of the after engine room to a height of approximately one foot above the upper level and the forward engine room to a height of approximately six inches below the upper level over a period of 20 days rendered the equipment in these areas inoperable. The flooding of these spaces was due to a small opening in shell plating, frame 124, and rupture of the cooling water line to the starboard shaft gland, all of which could have been easily controlled had a crew been onboard.

(b) Areas of major damage.

None - Superficial damage throughout ship. Master gyro compass in I.C. room flushing pump in after engine room, signal searchlight on signal bridge and post test flooding of forward and after engine rooms.

(c) Primary causes of damage in each area of major damage.

Underwater shock.

(d) Effect of target test on overall operation of electrical plant.

1. Ship's service generator plant.

No damage - (could not be operated due to post test flooding of engine rooms).

2. Engine and boiler auxiliaries.

No damage. (could not be operated due to post test flooding of engine rooms).

3. Electrical propulsion.

Not applicable.

4. Communications.

Ship control communications remained intact and from visual inspection were operable. Damage to master gyro compass rendered it temporarily inoperable.

5. Fire control circuit.

Fire control circuits remained intact. A type "J" telephone selector switch for anti-aircraft control was dislodged from its foundation and hanging by the cable. The switch was undamaged and appeared operable.

6. Ventilation.

No damage to motors and controllers.

7. Lighting.

The general lighting was intact throughout the ship, except for a few lamps broken in the machinery spaces , the system was undamaged.

(e) Types of equipment most affected.

Master gyro compass.

B. Electric Propulsion Rotating Equipment.

Not applicable.

C. Electric Propulsion Control Equipment.

Not applicable.

D. Ship's Service Generators.

No damage.

E. Emergency Generators.

No damage.

F. Switchboards and Distribution Panels.

Glass lens was broken in the exciter voltmeter on the emergency switchboard. The meter appeared operable.

G. Wiring, Wiring Equipment and Wireways.

No damage.

H. Transformers.

No damage.

I. Submarine Propelling Batteries.

Not applicable.

J. Portable Batteries.

The starting batteries for the emergency diesel generator were partially dislodged from their stowage rack. The batteries

Had not been secured with the required wood strongbacks. There was no damage to the batteries.

K. Motors, Motor Generator Sets and Motor Controllers.

(a) Motors for the following pumps were rendered inoperable due to flooding of the forward and after engine rooms.

1. Port and starboard jacking gear.
2. Two lubricating oil purifiers pumps.
3. Two cruising condensate and booster pumps.
4. Dynamo condenser circulating pump.
5. Dynamo condenser condensate and booster pump.
6. Flushing pump No.'s 1 and 2.
7. Port use fuel oil service pump No. 1.
8. Fuel oil tank drain pump No.'s 1 and 2.
9. Drain booster pump No.'s 1 and 2.
10. Diesel fuel oil purifier pump.
11. Diesel oil supply pump.
12. Evaporator feed and brine discharge pump.
13. Distiller condenser circulating and condensate pump.

L. Lighting Equipment.

(a) Several "rough service" lamps in lighting fixtures throughout the machinery spaces were broken. There was no damage to the lighting fixtures.

M. Searchlights.

(a) One 12" signal searchlight located on starboard side of signal bridge was dislodged from its mounting socket and found lying on main deck. The light was only damaged to the extent of a broken lens.

N. Degaussing Equipment.

(a) The enclosure for compass compensating control units (located on the forward bulkhead in pilot house) was damaged due to deflection of bulkhead stiffeners. The control units were undamaged.

O. Gyro Compass Equipment.

(a) The sperry Mk. XI, Mod. 4 master gyro compass located in I.C. room, second platform forward, sustained the following damage due to underwater shock. Binnacle cover, inspection doors and top of binnacle housing were dislodged and found lying on deck with glass broken. Suspension springs were slightly elongated, all binnacle ring holding down springs were detached. Binnacle ring guide post and cardan ring dash pot damper studs appear to be bent. A small amount of mercury was jarred out of ballistic reservoir air vent. It was noted that the oil level of rotor bearings was normal and rotor case vacumn gage read 29 inches (cold). It is believed that the total damage was due to violent upward motion of the ship and shift to starboard. Inclinometer readings were less than 10 degrees port and starboard. No apparent damage was sustained by the gyro motor generator set, amplifier, repeater and control panels or any other electrical gear located in this compartment, except for a small pressure switch mounted on the forward bulkhead which had the cover jarred off.

Remarks: It is recommended for future design of master gyro compasses that the suspension springs between the binnacle ring and binnacle be either increased in size or number, as several instances were noted where these were elongated due to rapid vertical acceleration of the ship. Some method of securing should also be devised in securing these springs so that they cannot become detached. Spillage of mercury from the ballistic could be prevented by employing an air return pipe between resevoirs,

similar to that used by Arma unit for their closed oil damping system.

P. Sound Powered Telephones.

(a) The mounting bolts were sheared on a type "J" rotary selector switch (circuit 49JY) located on after superstructure frame 122, centerline. Switch was undamaged and hanging by cable.

Q. Ship's Service Telephones.

Not applicable.

R. Announcing System.

(a) A type "H and M" reproducer located at 40MM control station, frame 122, superstructure deck, was dislodged from foundation. Weldings bolts were sheared, terminal tube in unit broken and cable severed. The damage was due to either blast or water pressure.

S. Telegraphs.

No damage.

T. Indicating Systems.

No damage.

U. I. C. and A. C. O. Switchboards.

No damage.

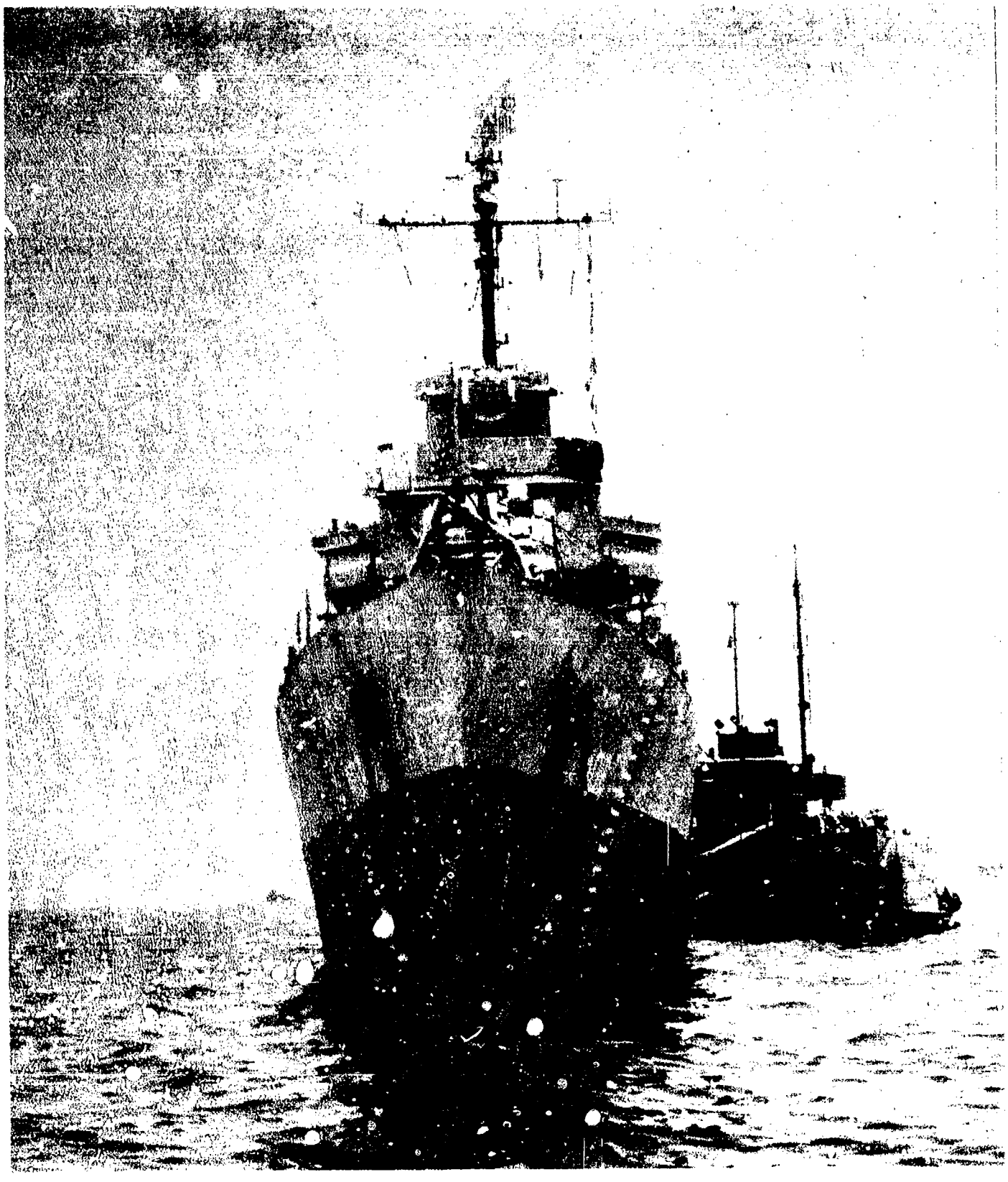
V. Fire Control Switchboards.

No damage.

SECTION IV

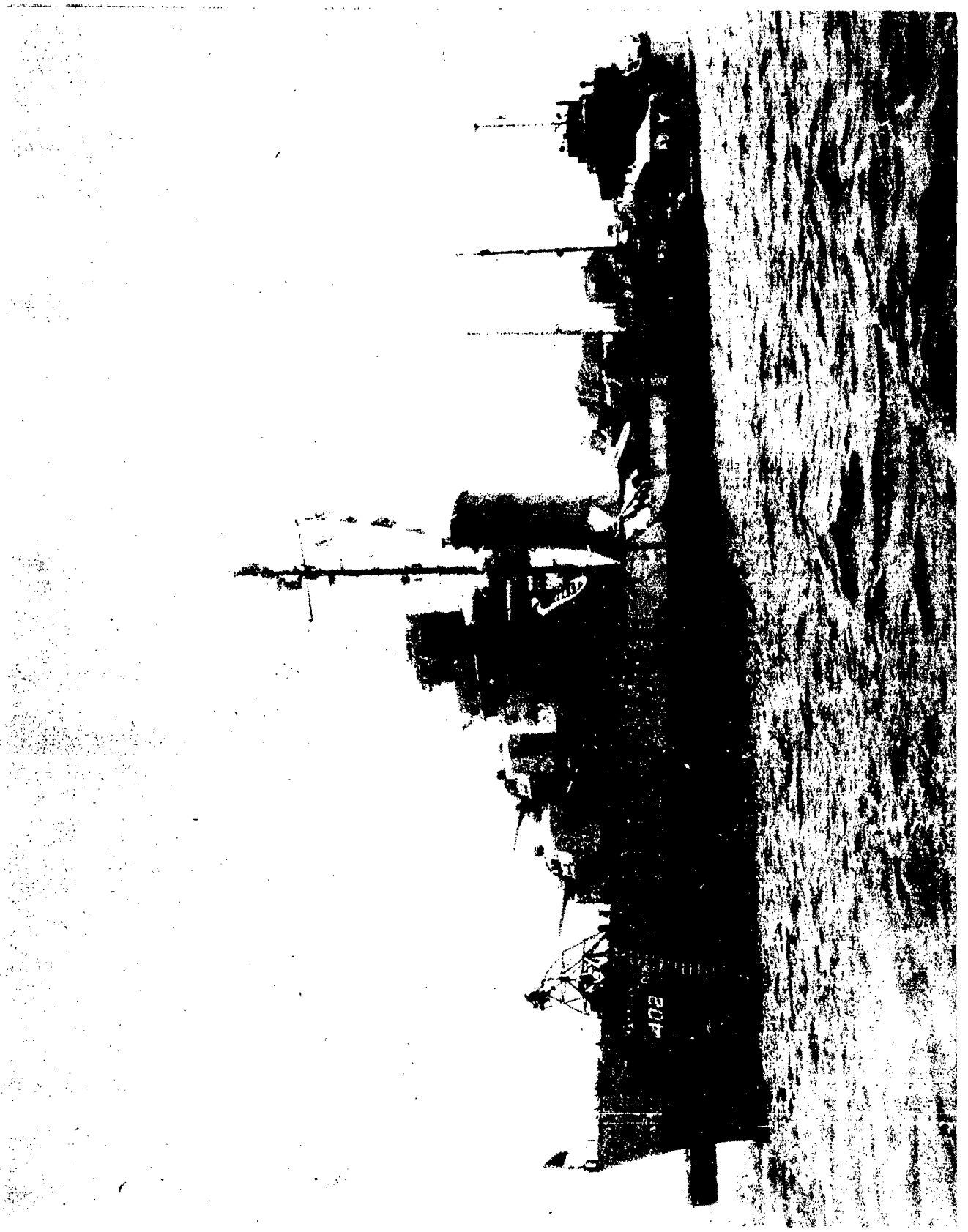
PHOTOGRAPHS

TEST BAKER

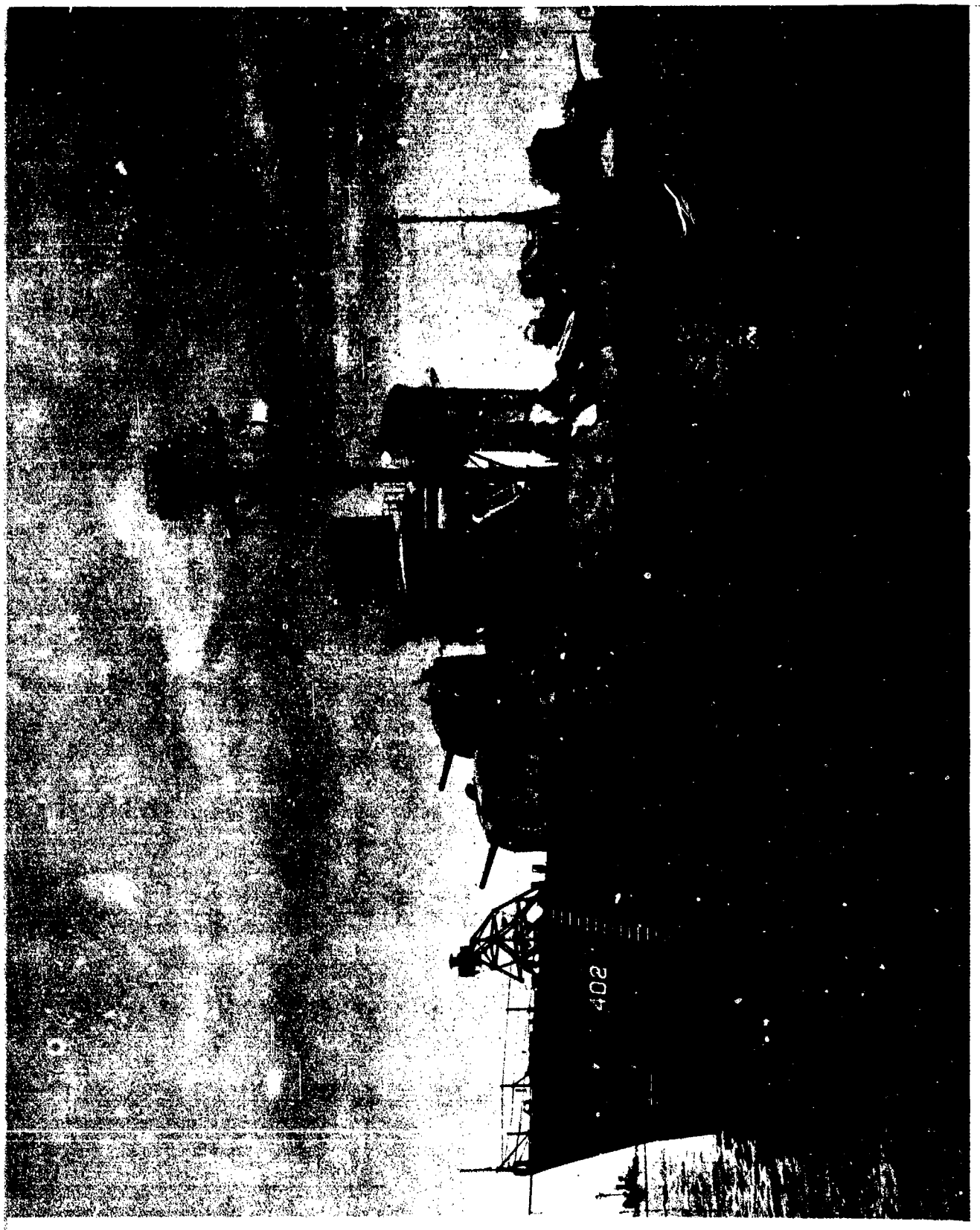


BB-CR-227-520-77. View from dead ahead before Test B.

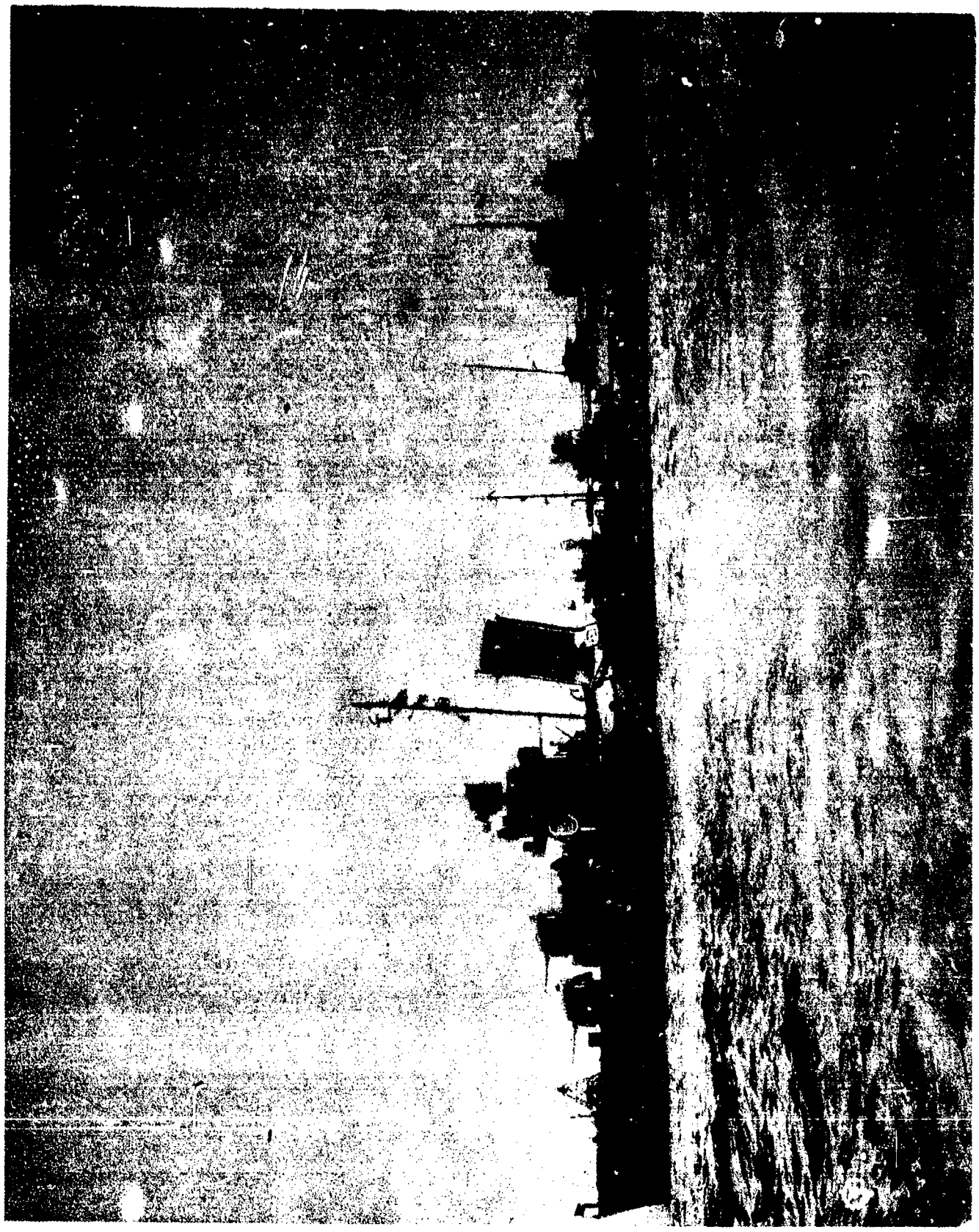
AA-CR-227-283-35. View from dead ahead after Test B.



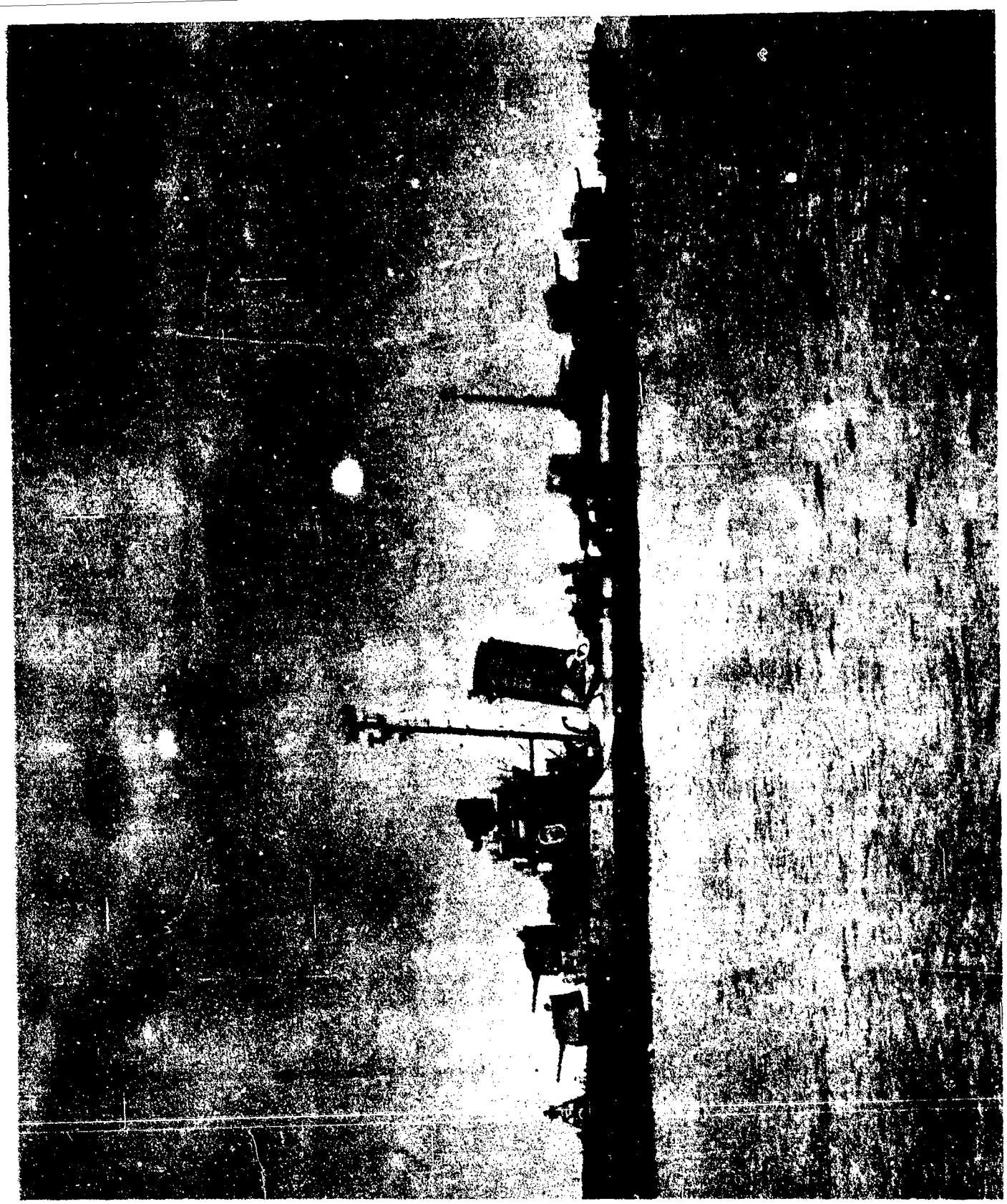
BB-CR-227-520-78. View from off port bow before Test B.



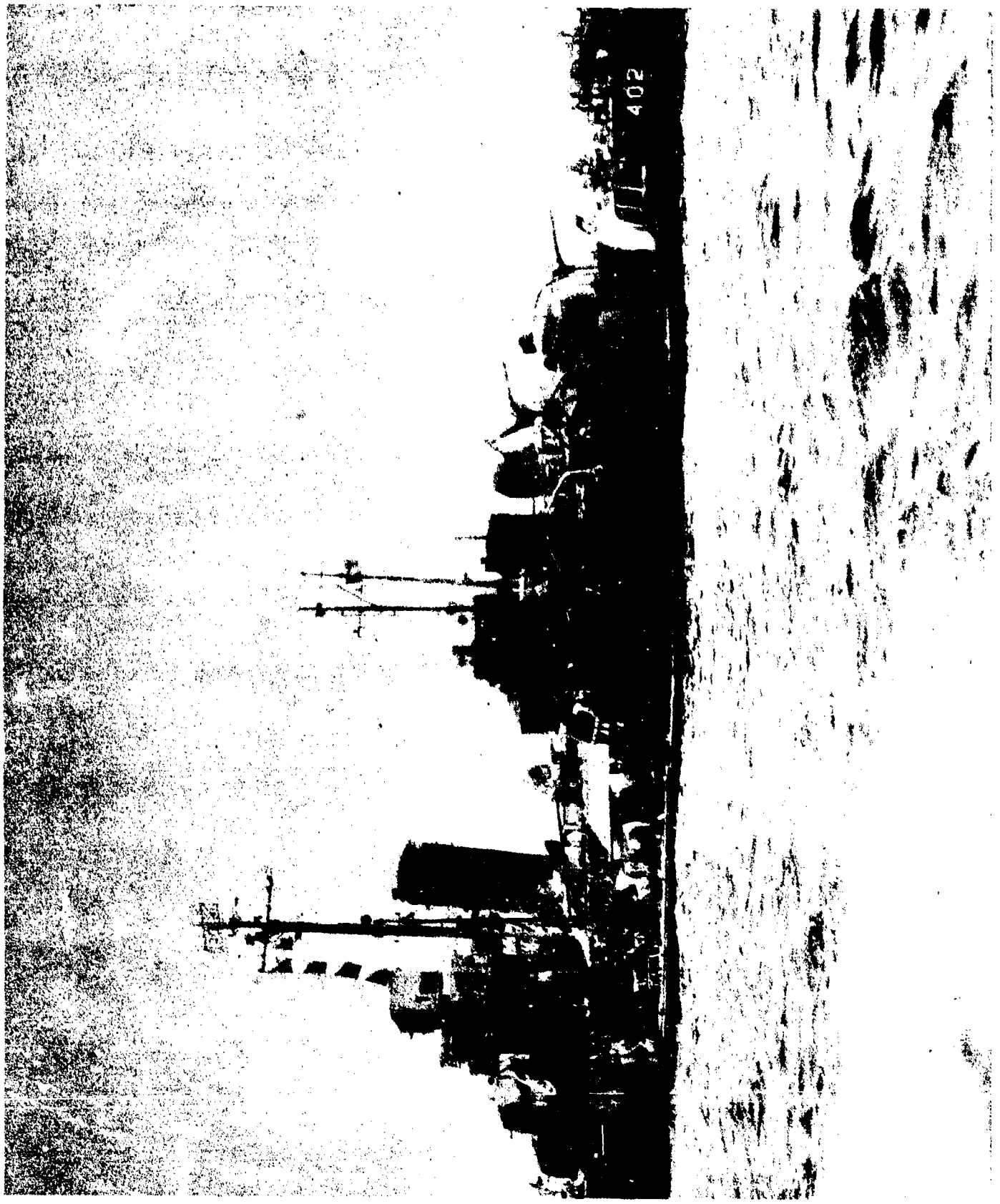
AB-CR-227-283-36. View from off port bow after Test B.



BB-CR-227-520-79. View from off port beam before Test B.

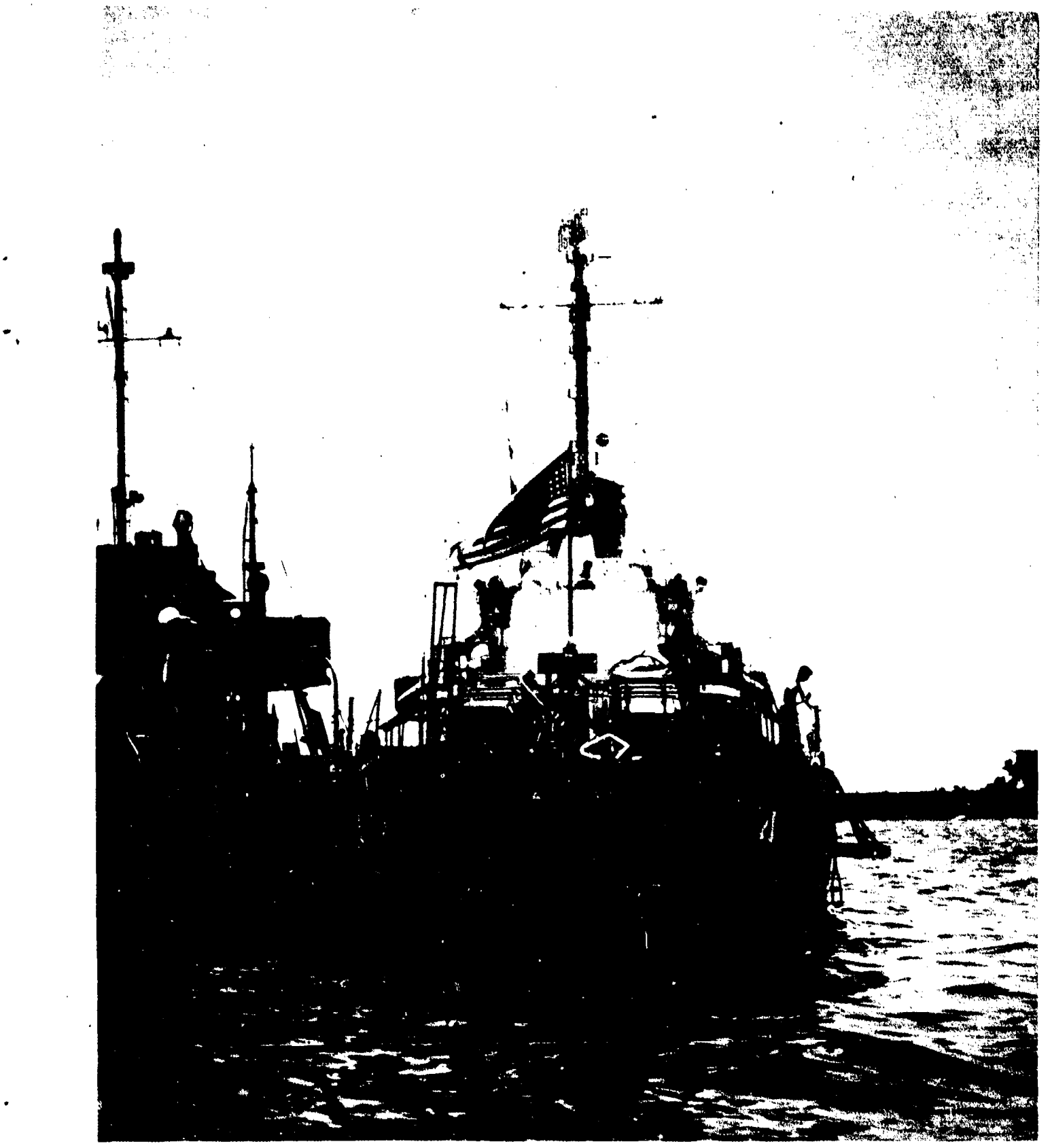


AB-CR-227-283-37. View from off port beam after Test B.



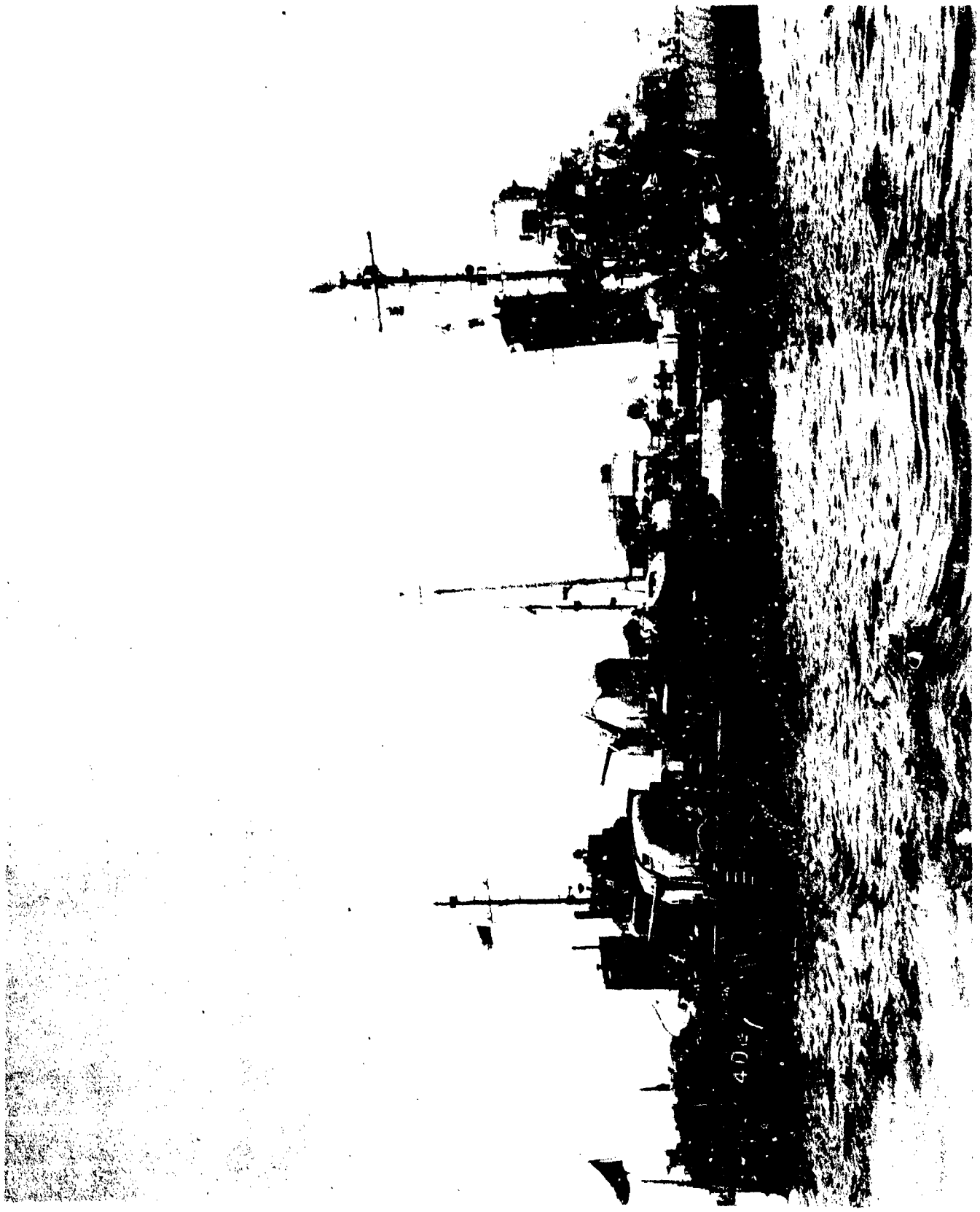
BB-CR-227-520-80. View from off port quarter before Test B.

AB-CR-227-283-38. View from off port quarter after Test B.

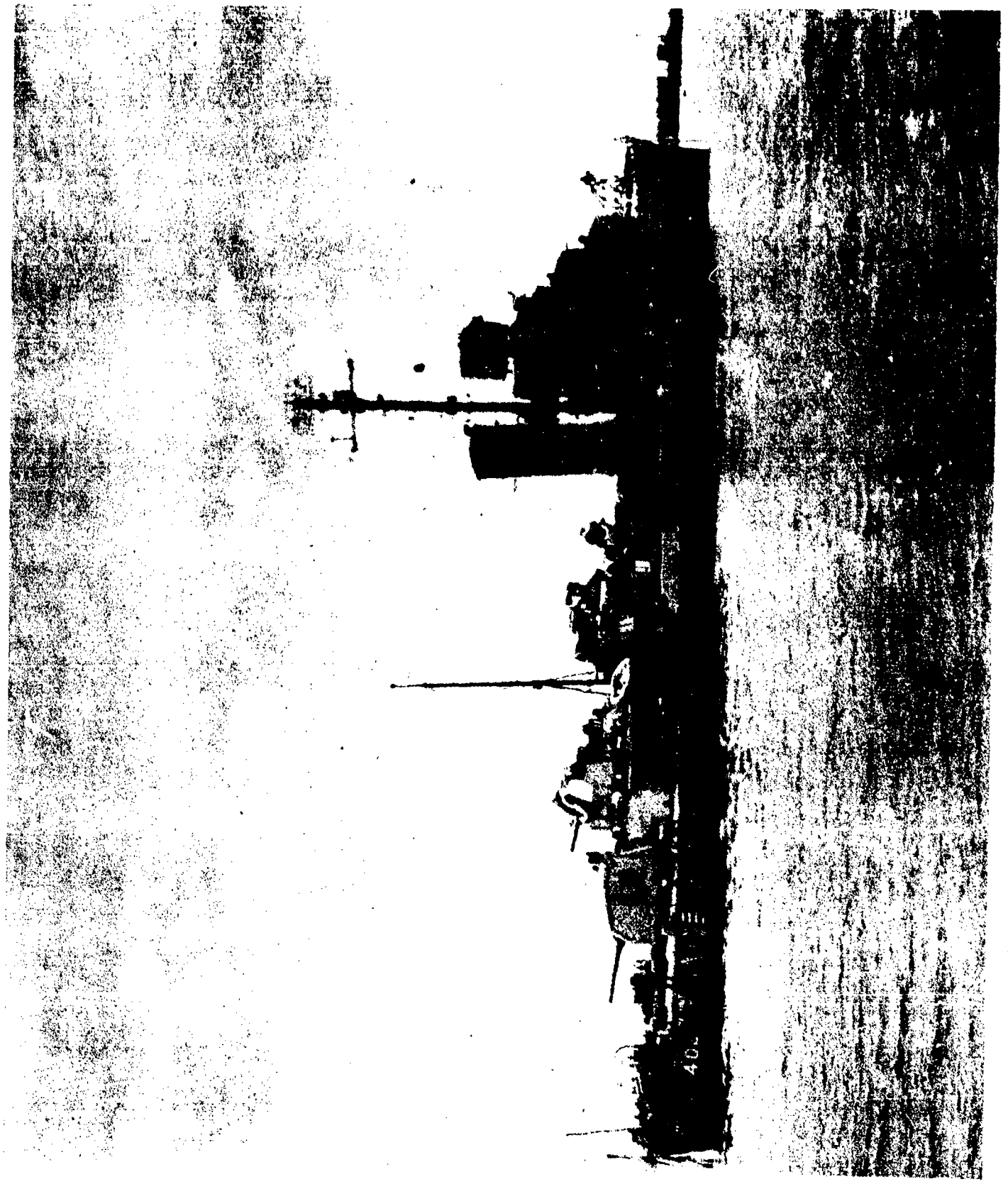


BB-CR-227-520-73. View from dead astern before Test B.

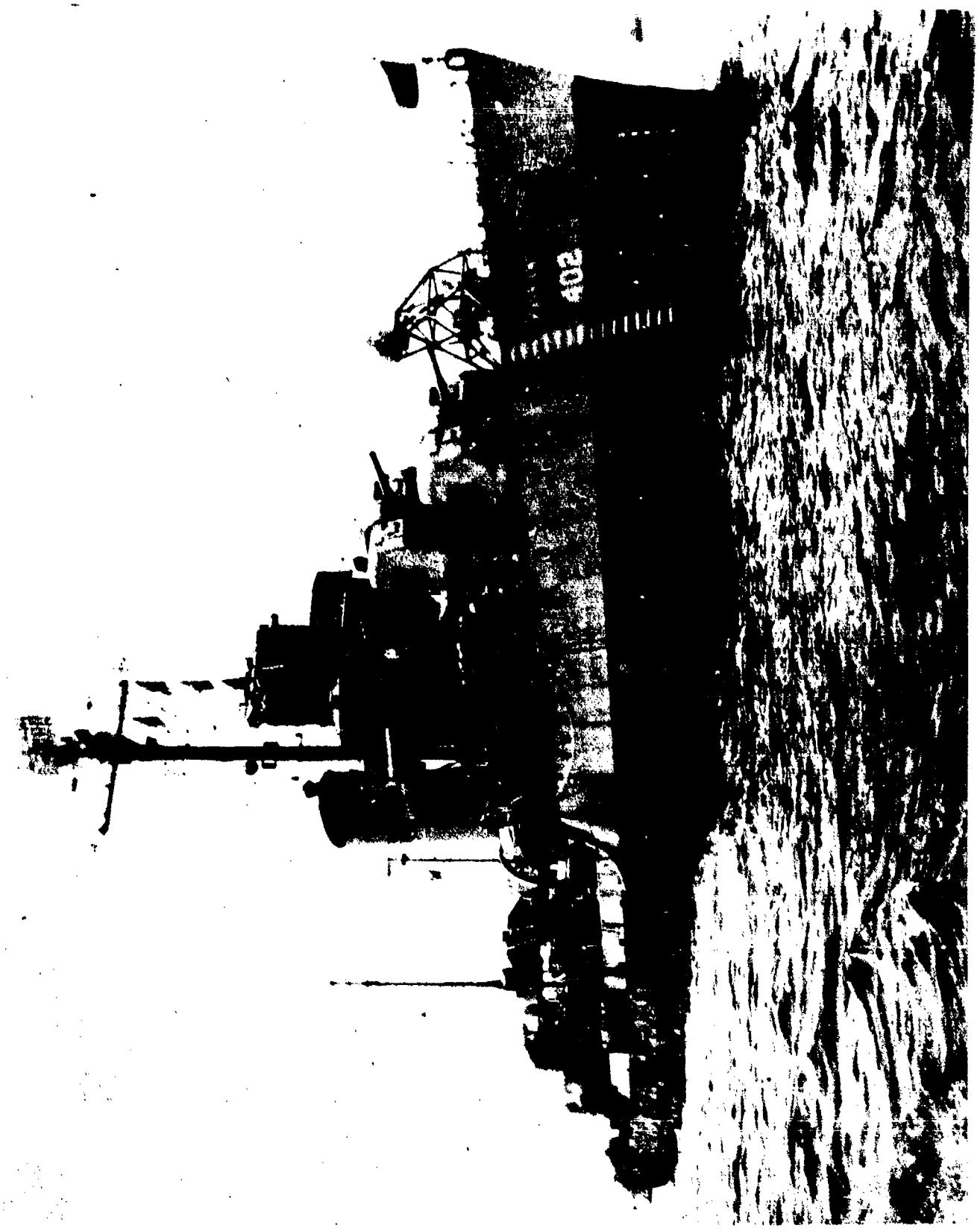
AB-CR-227-283-39. View from dead astern after Test B.



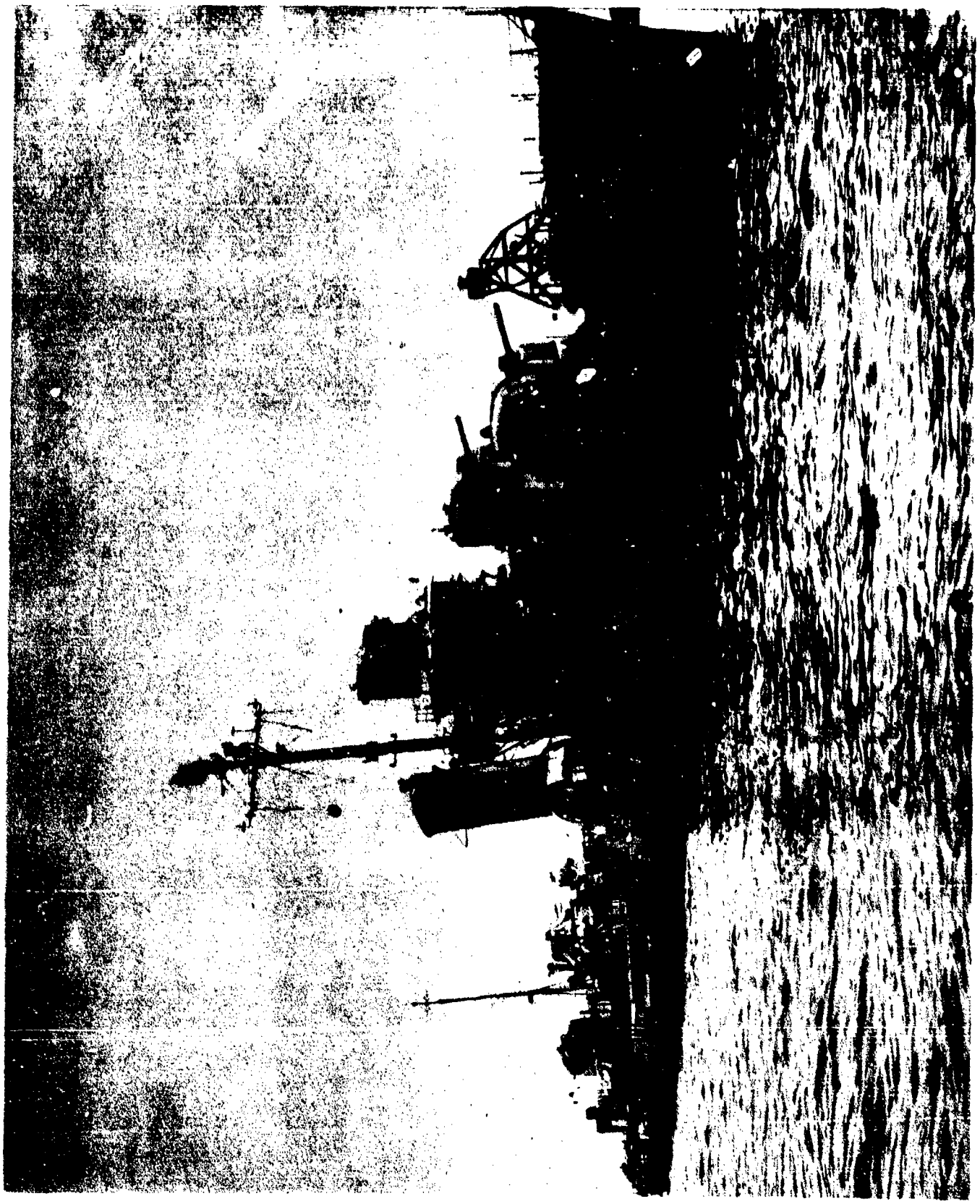
EB-CR-227-520-74. View from off starboard quarter before Test B.



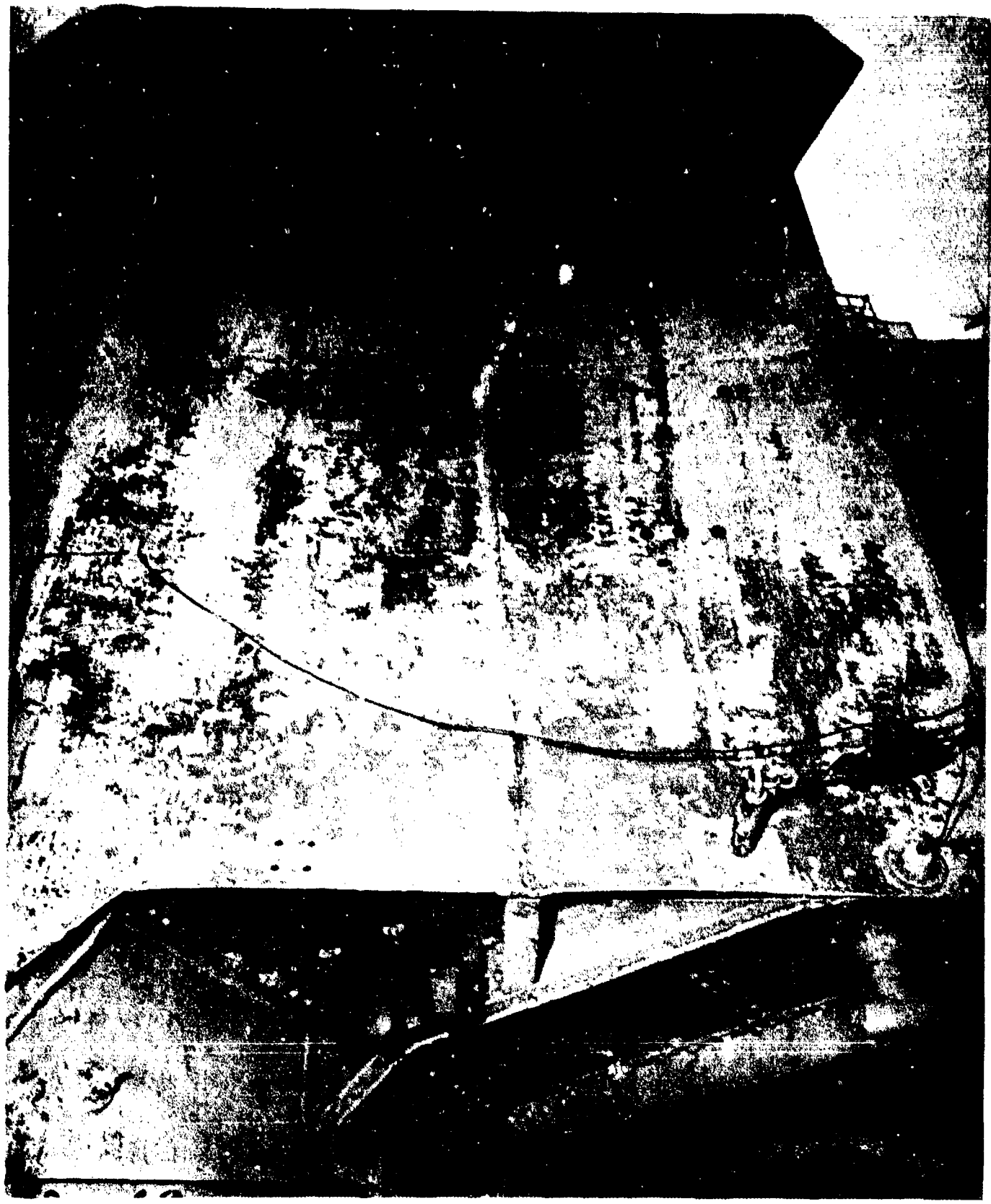
AB-CR-227-283-40. View from off starboard quarter after Test B.



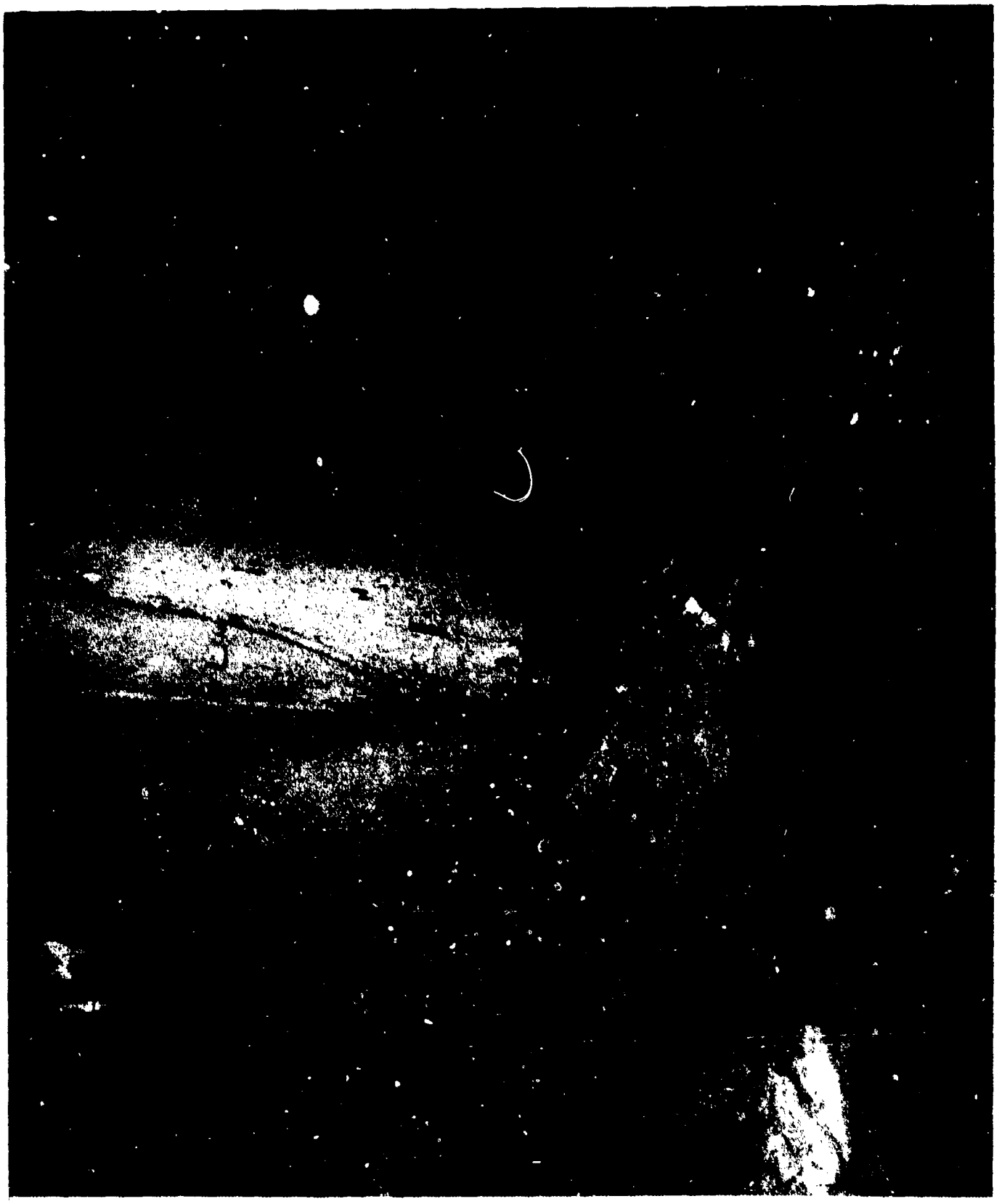
BB-CR-227-520-76. View from off starboard bow before Test B.



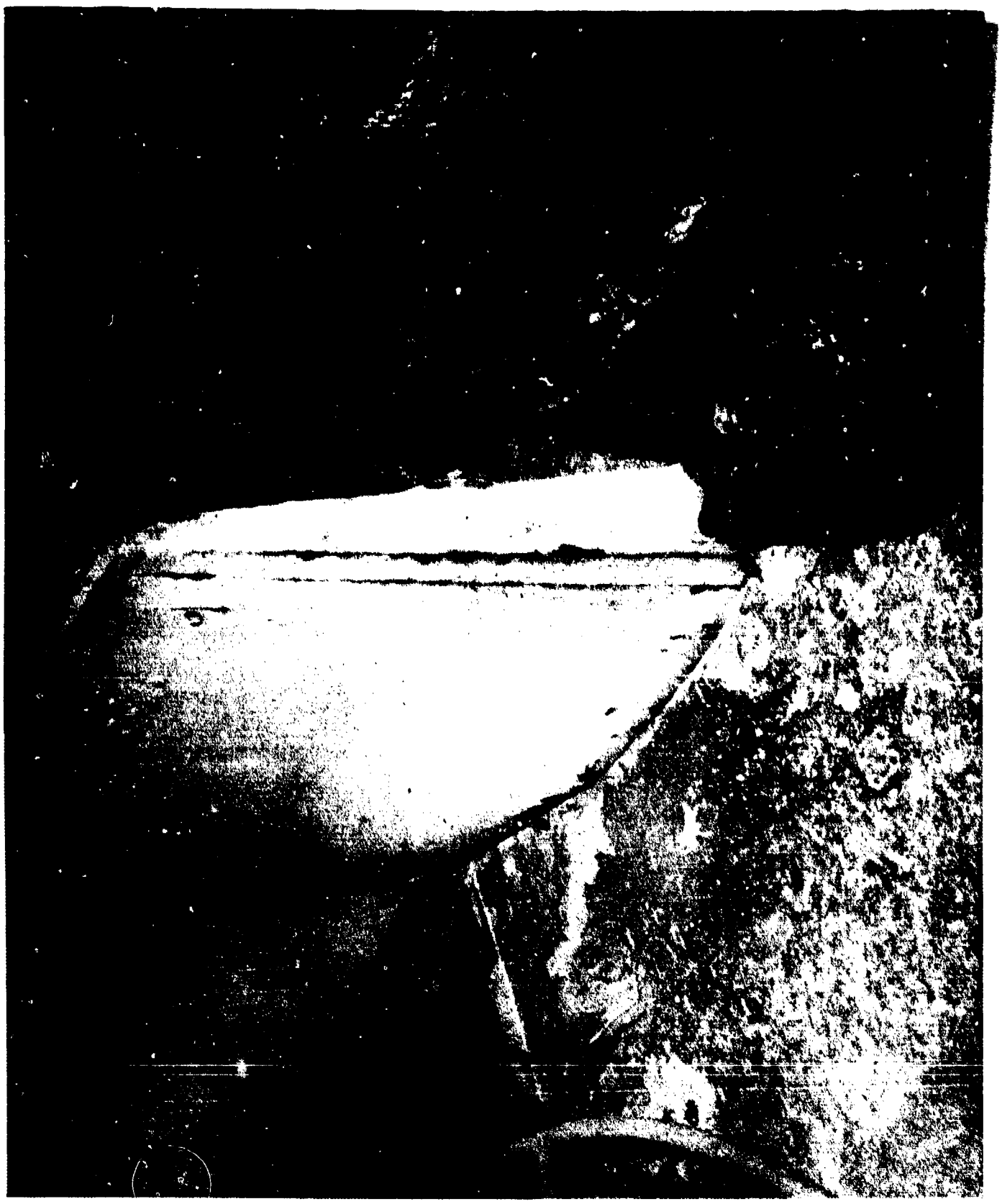
AB-CR-227-283-34. View from off starboard bow after Test B.



AB-CR-62-2177-11. Looking up at port face of navigation bridge, 03 level.



AB-CR-62-2177-10. Looking at buckled corner of port forward corner of deckhouse at frame 57, 02 level.

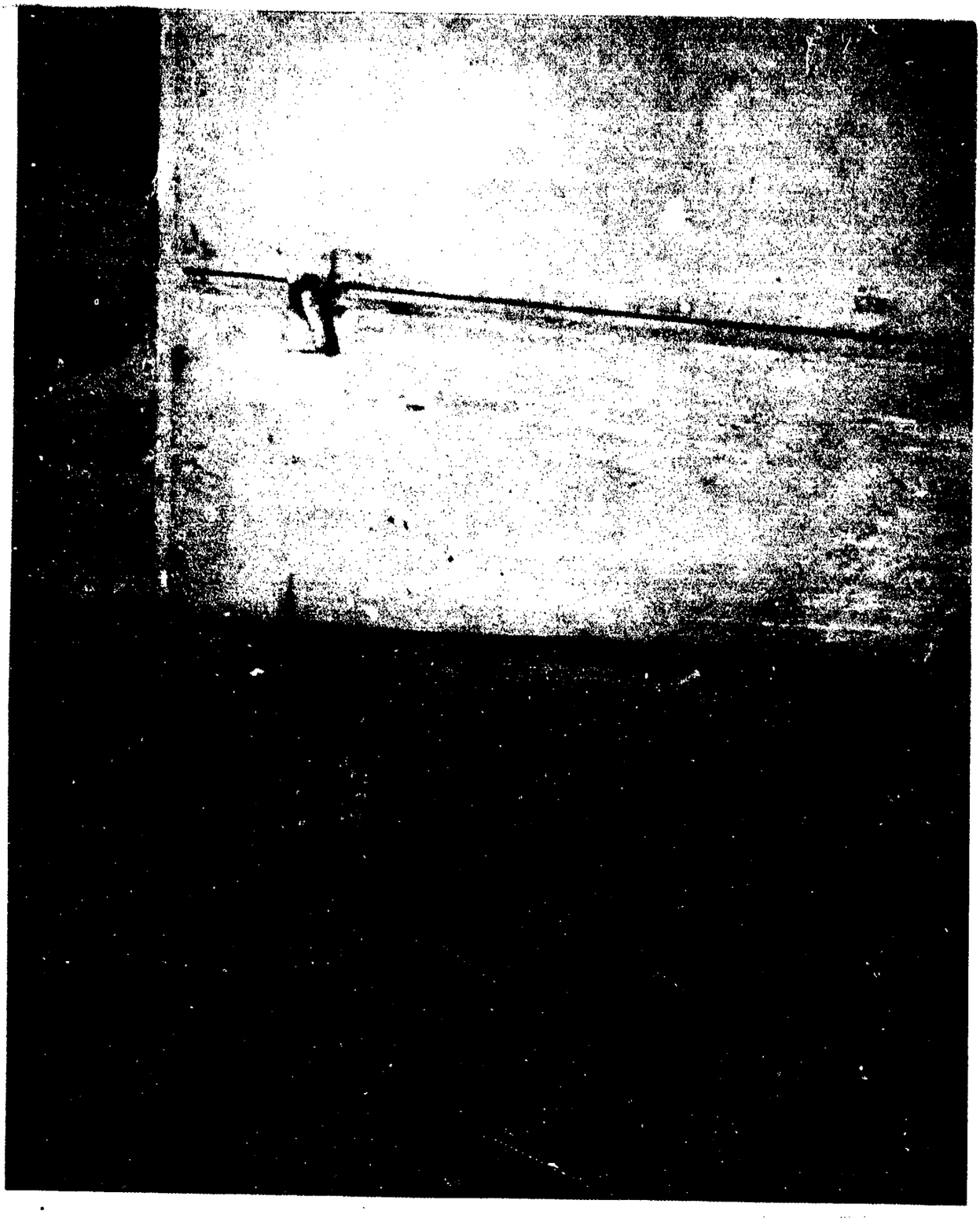


AB-CR-62-2177-5. Typical damage to light metal bulwark.

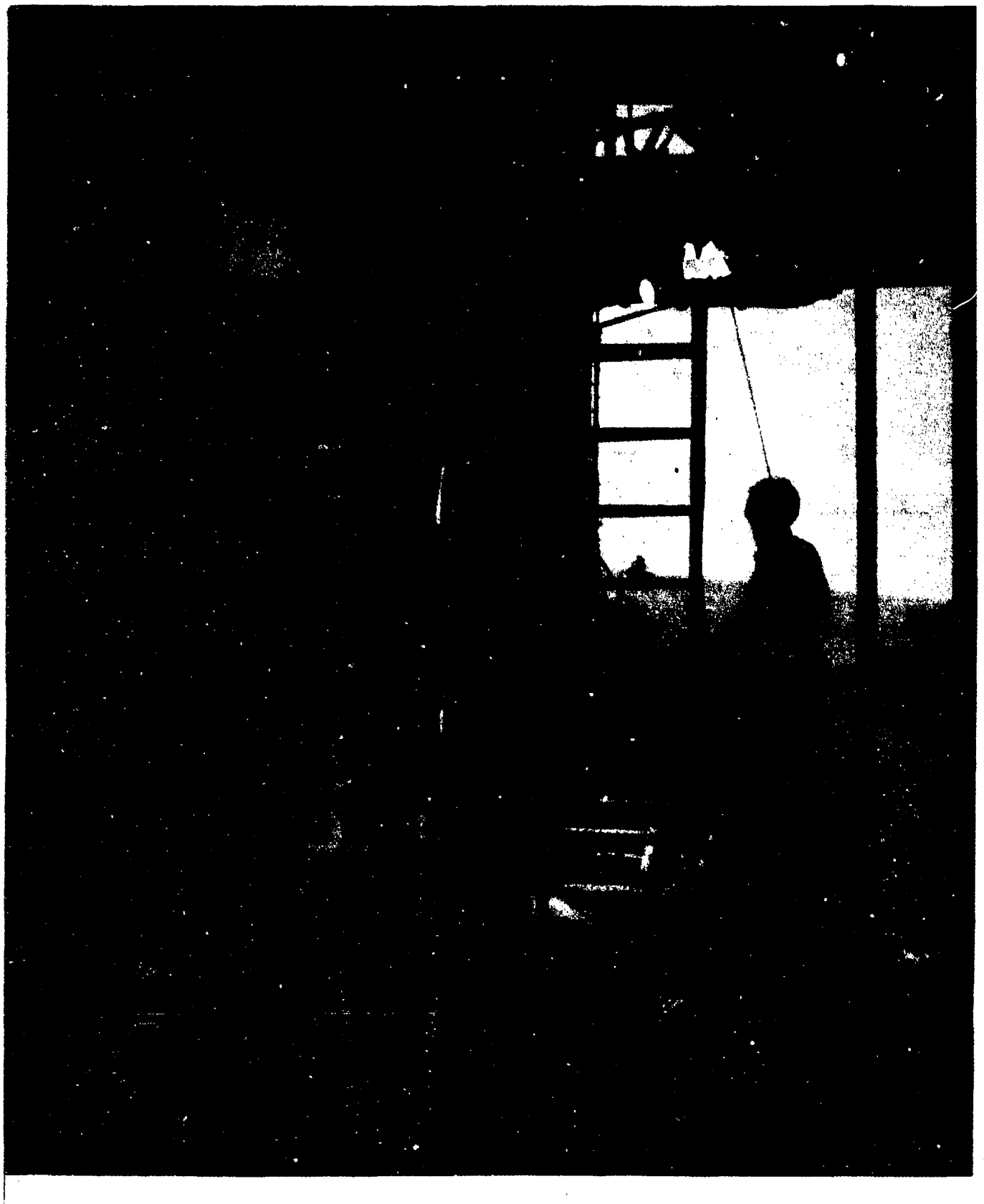
AB-CR-62-2177-7. Typical damage to light metal bulwark, starboard side aft.

AB-CR-62-2177-8. Looking forward on starboard side 02 level, frame 55.

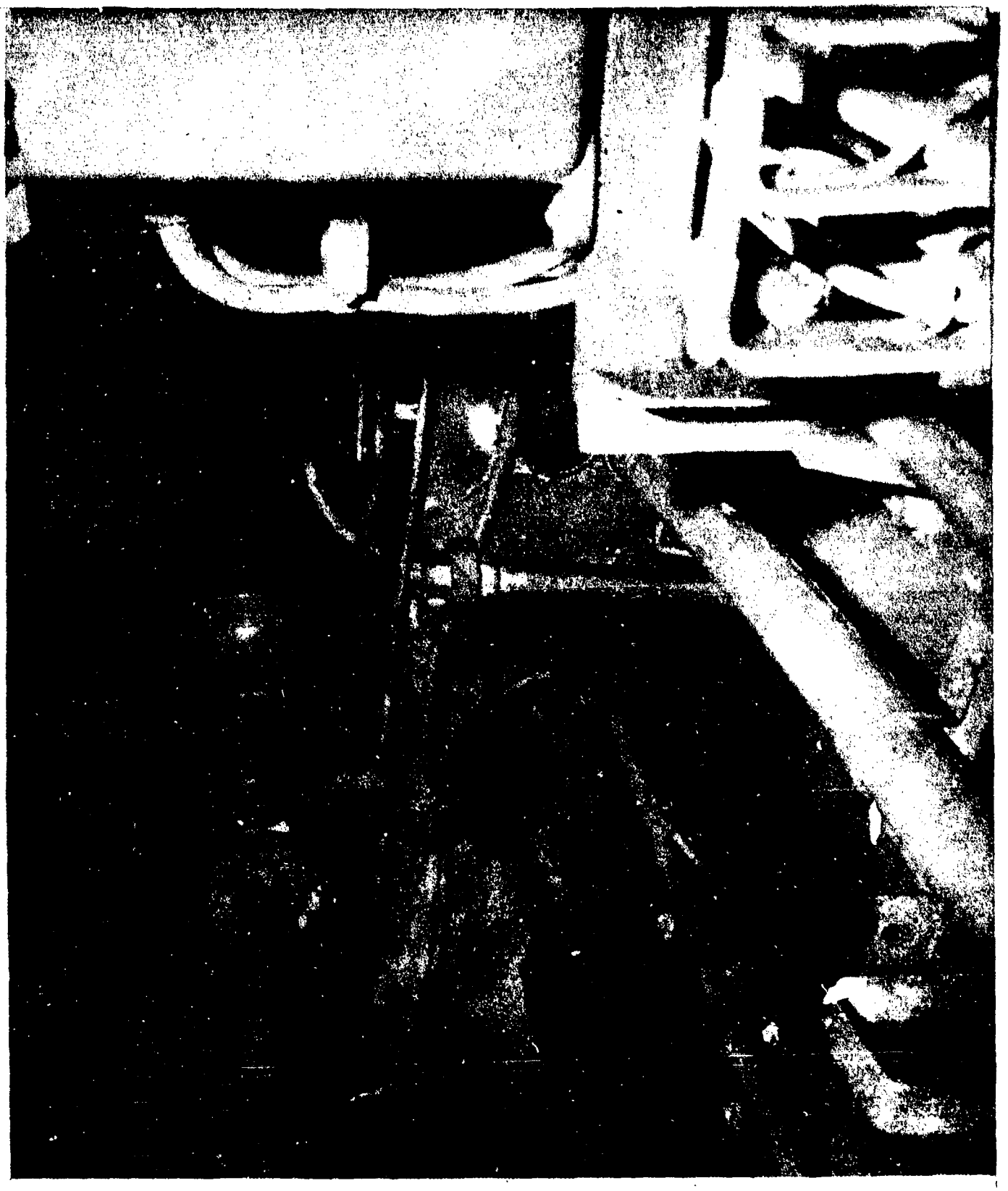
AB-CR-82-4220-12. Looking forward along port side of uptake from No. 1 boiler. Main deck.



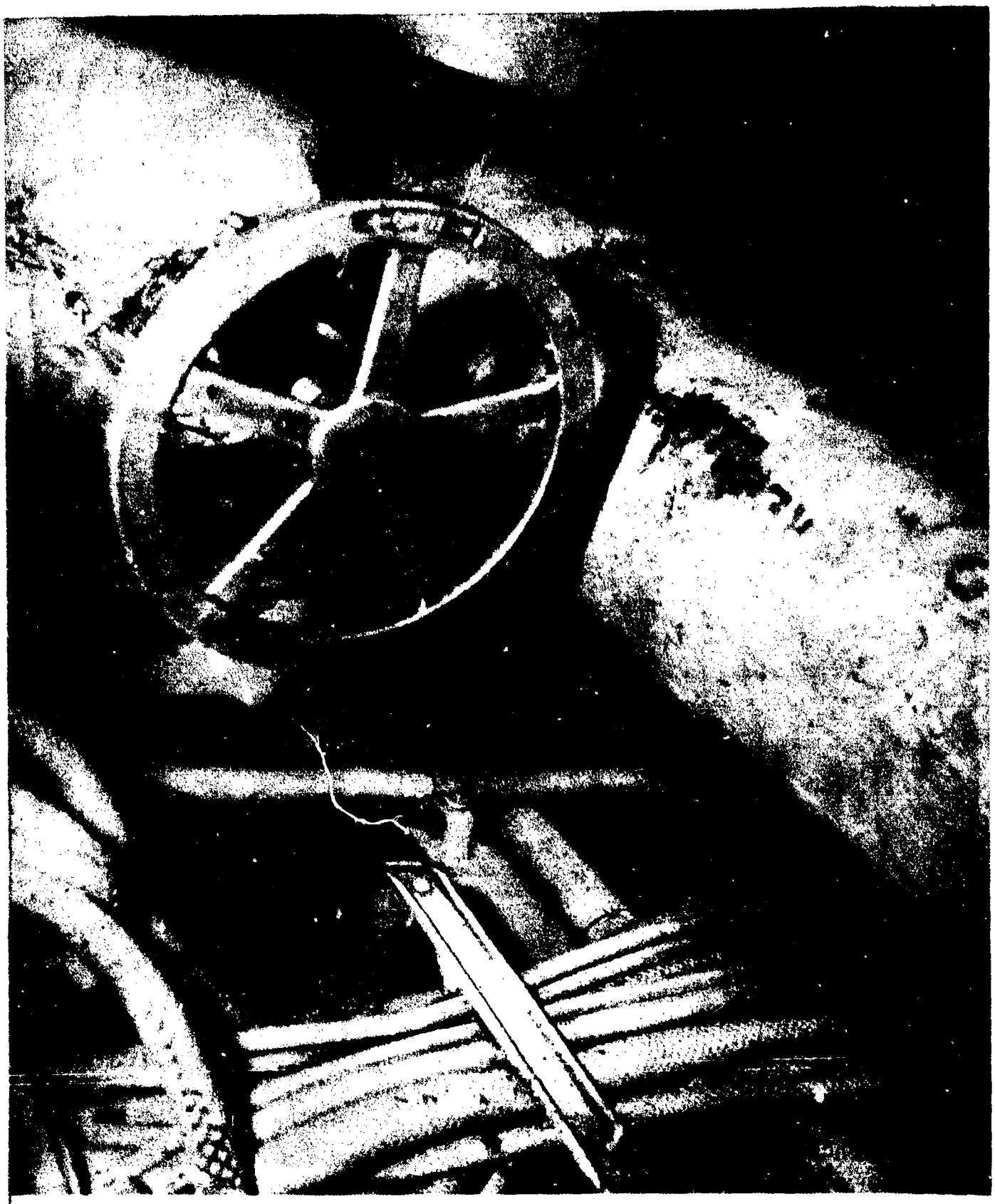
AB-CR-62-2177-12. Looking aft on main deck at bulkhead 131, forward face of after deck house.



AB-CR-62-2177-4. Looking aft on port side of 02 level at dished door frame 60.

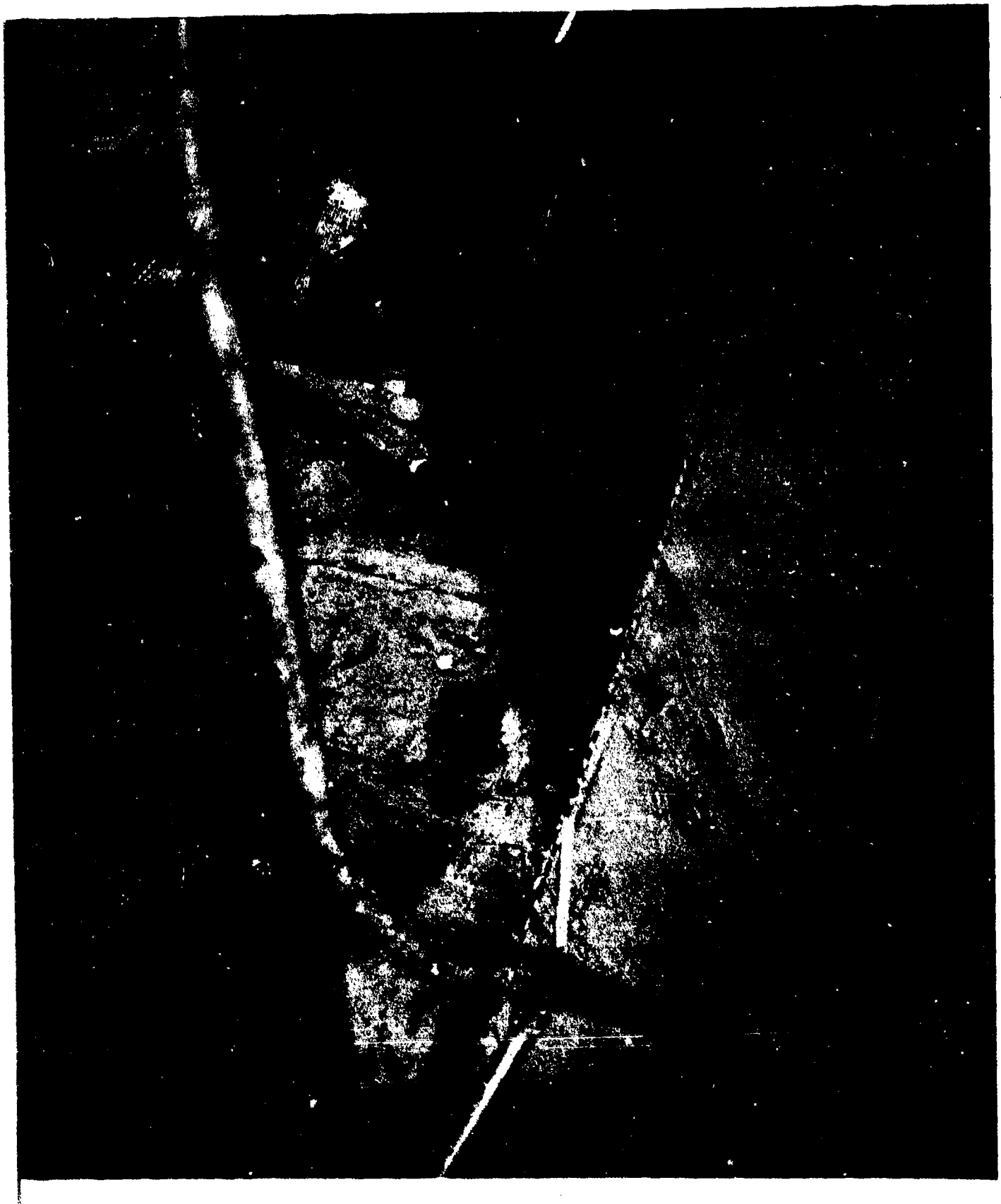


AB-CR-62-2177-1. Frame 104, starboard, looking forward at buckle in way of un-reinforced lightening hole.



AB-CR-62-2177-2. Frame 108, starboard, looking aft at buckle in way of un-reinforced lightening hole.

AB-CR-62-2177-3. Frame 108, starboard, looking forward at buckle in way of un-reinforced lightening hole.



AB-CR-82-4221-1. No. 1 uptake, port side from top.

AB-CR-82-4221-2. No. 1 uptake, starboard side from top.

AB-CR-82-4221-3. No. 1 uptake, starboard side.

AB-CR-82-4221-4. Port use blower of No. 3 boiler.

AB-CR-82-4221-5. No. 1 fire room, main steam line hanger.

AB-CR-82-4221-6. No. 1 fire room, main steam line hanger.

APPENDIX

COMMANDING OFFICERS REPORT

TEST BAKER

COMMANDING OFFICERS REPORT

REPORT # 5

PART A - GENERAL SUMMARY

I. Target Condition after Test.

The U.S.S. MAYRANT was inspected by ship's force on 15 August 1946. This vessel has been subjected to considerable shock and to damage caused by wave action or from tremendous amounts of water falling from above, and is highly radioactive. It is believed that the ship was swinging to a southerly breeze, thus the center of the blast bore 350° relative.

(a) The draft aft, 15 days after Test B, had increased approximately 2 feet. The ship had taken a list to starboard of approximately 5°. The forward engine room was flooded to about 12 1/2 feet. The after engine room was flooded to 14 feet. No other flooding. These levels were reached after a period of 15 days. The ship was pumped out and a few broken lines plugged. Thereafter there was no more flooding. Source of flooding is discussed below.

(b) Structural damage was moderate. Damage was generally topside. There is very little damage below decks. All main deck, deck houses had their doors dished in and sprung. The uptakes had been dished in; also rivets in uptakes have been fractured. Hand rails and superstructure had been twisted or bent. The doors in superstructure had been dished and sprung. The rear of 5" mount #1 has been dished in. The bulkhead at frame 104 forward engine room is dished slightly. Various ventilation ducts have had sections thrown out. There is a very small hole in the hull near the water line between frame 125 and 126 on the port side. However, this is believed to have been caused by reboarding and decontamination tugs when alongside. Little, if any, flooding was caused by this hole.

(c) Because of flooding of engineroom spaces above level of all electrical pumps, no electrical pumps are believed to be operable. No power is available as diesel generator room is unhabitable because of radioactivity. No power can be supplied until circuits have been tested and no time was available for that. All steam lines in engine -

ering spaces seem to be intact. All main and auxiliary machinery believed to be secured on foundations, except one flushing pump meter. Salt water lines had been fractured in several places but are not considered vital to operation of plant during period necessary to repair them. The boilers appeared to be in good condition. Brickwork is still in place. However the water level in the boilers has gone out of sight. There was no way to test the watertightness of the boiler. With present radioactivity there is no way to test the tightness of the condensers. Therefore it is impossible to say what the state of operability in which any of the machinery is in. All ordnance equipment is operable by manual control. Some manual controls to the electrical fire control instruments are frozen. However this is probably due to decontamination methods used rather than Atom Bomb Damage. The tubes in electrical equipment seemed to stand up well. However it is doubtful whether the equipment would all function after the test because of shock damage to cables and connections, etc.

(d) There is no evidence of heat damage or fires. Radioactivity is very high and probably would have caused many casualties outright. Unless positive decontamination measures could have been accomplished immediately it is doubtful if anyone would survive for a long period of time. There are some spots on the ship now with a safe tolerance of only 3 minutes (using exposure of 0.1 roetengen per 24 hours as a maximum safe upper limit).

II. Forces Evidenced and Effects Noted.

(a) No heat noted.

(b) No fires or explosions.

(c) Shock was intensive . Initial underwater shock is believed to be cause of fractured lines and material and equipment ripped from spot weld studs. However the dishing in of bulkheads, doors, twisting of handrails, etc., is believed to have been caused by wave action or by the weight of water falling down on the ship. The ship is afloat now and in a watertight condition because of the fact that it was heading nearly in direction of the blast. It is the belief of this C.O. that if the broadside had been exposed at that same distance the ship would have had its watertight integrity seriously hazarded. It is believed that the wave action came from just slightly on the port bow.

(d) Pressure seemed to come from all directions. The uptake casings, the deck houses, etc., all seem to show the pressure coming from all sides.

(e) It is apparent from inspection below decks that the ship has been violently shaken and tossed about. All projectiles have been tossed from their stowages and gear tossed about, floor plates and gratings in engineering spaces displaced, etc.

III. Results of Test on Target.

(a) Unable to determine effect on ship control and propulsion because of the long period of uncontrolled flooding enforced by high radioactivity during which the engine rooms were allowed to partially flood.

(b) It is believed that gunnery could have been continued manually if personnel casulaties did not prevent it. It is doubtful whether fire control would have functioned until breaks in cables repaired or circuit breakers reset, etc.

(c) Effect on watertight integrity and stability.
After fractured lines had been plugged and instruments removed from condensers closed up, flooding ceased. After flooded spaces were pumped out no additional water entered. Therefore watertight integrity and stability were not affected. It is believed that such spaces could easily have been kept pumped if personnel survived initial radioactive exposures.

(d) The ship after 21 days is still unhabitable even after decontamination efforts have been made.

(e) Additional definite information must be obtained after the ship is further decontaminated before estimate can be made upon the fighting efficiency. If power were lost due to failure of both main condensers the ship would have been stopped dead in highly contaminated waters. There is no doubt but what the fighting efficiency would have been very greatly reduced by shock and wave damage even if prpulsion power were not lost.

IV. If the ship had not been subjected to the radiological hazard it is believed it could have been repaired and damage controlled quite simply, (if main condensers have not been made inoperable). However, elimination of the radiological hazard at that close distance to the explosion seems to be a very difficult problem in a destroyer.

V. No comment.

PART C

TECHNICAL INSPECTION REPORT

SECTION I - HULL

A. General Description of Hull Damage.

(a) The overall watertight condition of the vessel is fairly good. Hull damage below main deck is neglegable. Damage to the superstructure would allow some water to enter from weather or spray.

(t) General areas of hull damage are in the superstructure, uptakes, and deck houses. One engineroom bulkhead slightly dished.

(c) Apparent cause of hull damage is solid water pressure from above or from wave action. The shock damage to the hull is very slight.

(d) Only areas of flooding are the two enginerooms. Two salt water lines are known to have been fractured and flooding at slow rate was from these lines. A small amount might have come from stern tube glands. Several fresh water measuring cocks were jarred open and most of fresh ater feed water drained into the engine room space. There are no oth r known sources of flooding. After these sources were corrected and spaces pumped out flooding ceased. Other than its present condition of radioactive contamination, the hull would not cause any condition of inoperability of the ship. The buoyancy is the same after pumping out as it was before Test B. It is not believed that the structural strength of the hull has been greatly affected. All weak members in the ship's structure are the result of the damage caused by tugs which towed the ship alongside and when reboarding or taking test material off the ship.

B. Superstructure (exclusive of gun mounts).

(a) Considerable damage has been done to the superstructure. Almost all doors have been dished in and sprung by blast or water pressure. No dimensions were taken other than a general measure of 3 1/2" for movement of center of doors inboard of the normal position.

1. The bridge area had been very greatly shaken up. All semi-secured gear has been cast adrift. The electric heater has been torn from its brackets. Both flag bags have been ripped from brackets, (one is missing, the other hanging on a mast guy wire which has cut partially through the flag bag). All doors badly distorted and dished. Unable to open chart house door in short time available on board. Chart house was inspected through a port. The chronometer box was thrown on deck. Other loose gear was thrown about. In the pilot house the forward bulkhead had been pushed in 3 to 6 inches. The chart desk was loose. The remote PPI appeared to be intact. No electrical tests were made. The overhead was bent up, about 2 feet from the forward bulkhead. No fractures were noted.

The compensating spheres on the binnacle were loose. The sound power telephone selector switches on forward pilot house bulkhead loosened but the wiring was still connected. Many electrical cables were observed to be loosened in packing glands. The handrails above pilot house were twisted and pushed back. A canvas wind screen which is now missing had been installed on those handrails. The signal bridge deck is bent and ripped. Most signal halyards are in place. The radiological contamination is very high in the bridge structure. Sea shells and small amount of sand were noted on deck of starboard wing of bridge. Forward bulkhead of CIC dished in approximately 5".

2. Midships Deckhouse and Stacks.

The midships deckhouse are of aluminum with CRS doors and knife edge structures secured to the aluminum bulkheads by rivets. The following WT doors were dished in about 3 1/2" and were distorted.

1. torpedo workshop door (1-123-1).
2. logroom door (1-99).
3. Machine shop door (1-101).
4. laundry door (1-70-2).
5. port galley passageway door (1-62-2).
6. CIC doors port and starboard (2-61-1, 2-61-1).

Otherwise the actual deckhouses were intact. The uptake casing was ruptured at seams on both sides of ship. The stack is in place. The wire mesh screens which had been covered with canvas prior to the test have been caved in, distorted and forced down the ducts of firerooms exhaust blowers. Stowage lockers in Ship's Office had been cast adrift from bolted or light spot welded moorings. There was some water (2" to 3") in the Division Commander and Captain's Cabins. This is believed tc have entered via ventilation systems while ship was being washed down. The water is very hot radiologically. The damage to radio equipment is covered in another section.

3. After Deckhouse. No special comments. There has been a general shaking up of equipment from shock. Glass mirrors in heads were broken. Gear was thrown about.

(b) The damage comes from two sources. Initial shock and wave action. The initial shock broke things loose from moorings. The wave action is believed to cause the shaking up of the ship, and the pressure of the water for the dishing in of doors. The initial blast may have caused the uptakes to rupture and the dishing inof doors.

(c) No fires.

(d) The only comment the C.O. desires to make on this section is that additional strength must be built in joints where aluminum and steel are joined together.

(e) A general streamlining of superstructure must be accomplished with and idea to shed water fast and completely, and to better stand blast. From information available at this time radioactive contamination is believed to be by far the greatest damage to the MAYRANT. It is believed that all other damage could have easily been controlled and repaired by ship's force with exception of straightening out dished doors, etc.

C. Turrets, Guns, and Directors.

(a) Protective Mounts.

(1) General Condition.

A. 5"-38 Gun Mount.

1. Gun #1:

(a) Back of mount dished in slightly.
(b) All ready service projectiles loose from hoists and on deck.

(c) Train and elevation in manual satisfactory.
(d) No visible damage to breech or mechanism.

2. Gun #2:

(a) Back of mount dished in slightly.
(b) Projectiles adrift from hoist.
(c) All loose gear in mount adrift.
(d) All ready service projectiles loose from stowage.
(e) Train and elevation in manual satisfactory.
(f) No visible damage to breech or mechanism.

3. Gun #3:

(a) Canvas top (uncovered mount shield) torn off.
(b) Projectiles adrift from hoist and ready service stowage.
(c) All loose gear in mount adrift.
(d) Train and elevation in manual satisfactory.
(e) No visible damage to breech or mechanism.

4. Gun #4.

(a) Projectiles adrift from hoist and ready service stowage.
(b) All loose gear in mount adrift.
(c) Train and elevation in manual satisfactory.
(d) No visible damage to breech or mechanism.

2. All mounts can be operated manually. It is doubtful whether they could have been operated electrically without casualty power installation of cables, etc.

B. Unprotected Mounts.

(aa) 40MM Guns.

1. Train and elevation in manual of both port and starboard mounts are satisfactory.

2. Both breech mechanisms appear to be in good condition.

3. All guns fire manually.

4. No visible evidence of other damage.

(bb) 20MM Guns:

1. 20MM gun #1 cam follower jumped up and is riding on the outside and will not train.

2. 20MM gun #1 shield distorted considerably on after side.

3. There is no other visible evidence of damage to 20MM guns.

3. The crew's shelter would not have been sufficient. It is believed that at least part of crews would have been washed overboa d.

(a) Directors and range finders.

1 and 2 general condition and condition of instruments therein.

(aa) Mark 33 5"-38 Gun Director:

1. Level and cross level have extensive torque (manual).

2. Train and elevation on manual satisfactory.
3. All plastic glass missing from sky lights and hatch windows.
4. Forward starboard side of shield dished slightly.
5. Inspection plate forward starboard side of shield caved in.
6. Tool boxes on outside of director, both port and starboard, sides caved in.
7. Gyro access door open.
8. Following bench mark readings taken: Train: 359°25', elevation: 16° 04'.

(bb). Mark 51 Directors:
1. No visible damage.

(cc) Mark 27 torpedo directors:
1. Broken glass in own ship and target ship dials on starboard director.
2. Torpedo speed knob on port director frozen.
3. No other visible damage.

(dd) Mark 42 Range Finder:
1. Both end window covers frozen (it is suspected that this damage was caused by exposure to weather and decontamination solution rather than by bomb blast).

2. No visible damage to external parts.

(ee) Mark 10 Range Keeper:
1. The following knobs frozen (it is suspected that this damage was caused by exposure to weather and decontamination solution rather than by the bomb blast):
(a) sight angle.
(b) sight deflection.
(c) own ship course.
(d) wind direction.
(e) synchronized elevation.
(f) elevation spot.
(g) generated bearing.
2. Time was applied to range keepers by manual crank and results were satisfactory, thereby indicating that instrument is operable.

3. No other visible damage.

(ff) Stable Element.

1. No visible damage.

(b) It is believed that the present trend to put as much of the fire control installation in the plotting room and other such protected places is well justified. Decontamination of radioactive material will probably be the cause for more damage to exposed electrical and fire control equipment than that caused by the Atomic Bomb. All units which can not be given this protection should be given the best water tight protective mounts possible. Mounts should be streamlined and have no place where water can accumulate.

D. Torpedo Mounts and Depth Charges.

(a) Torpedo Mounts.

1. Condition of mounts and equipment.
Mark 12 Torpedo Mount:
1. Starboard Mount.
(a) Broken tension links in torpedo stop mechanisms on barrels (two) which contained torpedos.
(b) Both torpedoes missing.
(c) Tube trains in manual but with excessive torque.
(d) No other visible damage.
2. Port Mount:
(a) All tension links broken in torpedo stop mechanisms.
(b) Three of the four torpedoes installed moved forward a slight amount. The fourth torpedo moved forward a distance of approximately five inches.
(c) Tube trains in manual but with excessive torque.
(d) No other visible damage.

2. No additional protection necessary for warheads and air flasks.

3. No comment. Satisfactory.

4. New method or stronger more secure method for retaining torpedoes in mounts until actually fired must be developed. Torpedoes will be lost overboard with present gear.

(b) Depth Charge - General.

1. Depth Charges:

(a) No visible damage to racks, roller loaders or K guns.
(b) Depth charge from K gun #3 and #5 missing.
(c) All other K gun charges were loose from arbors due to parting of special links in securing chains.

2. Satisfactory, No comment.
3. Satisfactory, No comment.
4. Securing gear for depth charges and arbors unsatisfactory. Has insufficient strength to stand up under the shock. Stronger securing gear must be installed.

E. Weather Decks.

No comment - Satisfactory. However, rapid decontamination methods for radioactivity must be developed.

F. Exterior Hull:

No comment - Satisfactory.

G. Interior Compartments.

(a and b) Structural damage negligible except in flooded engineering spaces. It must be remembered that complete inspection was made in about two hours time because of high radioactivity. Therefore some details may be vague or entirely missing. One stanchion was bent. All other damage is believed to have been caused by other sources than the Atom Bomb (tugs alongside, etc.).

(c) No damage to access closures and fittings below.

(d) Equipment has been thrown about by shock and flying bunks.

(e) No evidence of fire.

(f) Damage to piping is as follows: Salt water lines parted. Discussed under machinery. Damage to cables is undetermined. Several sections of ventilation ducts were thrown out by shock. Ventilation ducts must be of heavier or stronger materials.

(g) No increase in water tight subdivision is considered necessary in a destroyer.

H. No armor decks fitted.

I. Same as Item G. No further comment.

J. Underwater Hull.

No known damage.

K. Tanks.

No known damage to tanks. However, this should be investigated further after ship has been fully decontaminated.

L. Flooding.

(a) Forward engine room and after engine room were flooded to levels of 12.5' and 14', respectfully. This level was reached after 14 days of flooding.
(b) (1) Source of flooding are believed to be from two salt water lines which were fractured. Some flooding from the after engine room into the forward engine room was noted through electrical cable stuffing glands. No open boundaries.
(2) It is believed that the ruptured piping was very weak from corrosion. The whole fire main piping was in poor state of repair prior to the test.

(c) All flooded compartments would have been subject to damage control. The water level probably would have never risen above the lowest machinery in the space. A normal bilge pump could have kept it down and broken lines were easily plugged.

M. Ventilation:

(a) Damage to ventilation system and closures:

1. Several sections of ducts in living compartments were carried away by shock.

2. Closures except those subject to corrosion topside are satisfactory. Several studs for butterfly type closure nuts were fractured by the shock. However, these were heavily corroded prior tc the test.

3. No comment.

(b and c) No comment, Satisfactory.

(d) Some method to protect openings topside from entrance of water if ship subjected to high waves or excessive water fall out after blast must be devised. Wire mesh grating which had been covered with canvas was driven down into the duct by the blast of water pressure of the wave.

N. Ship Control.

1. Unless electric cables were parted it is believed that steering control could have been retained on the bridge. If that were not possible steering could have been accomplished from after conning station or from steering aft. It is doubtful if combat could have functioned without some casualty power rigging. One tray in the WC receiver indicator unit was thrown partially out. The ABK transponder and other equipment were thrown from their mountings. It is doubtful if the gyro compass would have functioned. The case was shattered around it and the glass cover was shattered. The various gyro repeaters seemed to be in a satisfactory condition. Sound power phones would have been used for interior communications.

O. Fire Control.

1. All automatic weapon control stations as well as the automatic weapon stations have insufficient protection for personnel. Personnel must be protected from radioactive spray. The location of stations for this class vessel is considered satisfactory. Comments on the fire control system have been given under Item C.

P. All ammunition exposed to the test in the MAYRANT is considered satisfactory. There was no known change or reaction in it.

Q. Ammunition Handling.

(a) All handling devices are believed to be in a satisfactory condition. However, several of the electric motor starter panels had the securing bolts to the covers fractured and covers thrown off. The projectiles left in the trays of the #1 five inch gun was thrown out of position. All ready service projectiles stowed in mounts and handling rooms were thrown from their stowages and would have been a tremendous hazard to personnel in those spaces. This stowage must be corrected.

R. Strength.

The ship's force personnel found no indications of permanent hog or sag or any evidence of great strain. Deck compression gage at frame 37, main deck, centerline showed one complete vibration approximately one half inch in length and deck compression gages at frames 147, 174, and 174, first platform deck, centerline, four feet port and four feet starboard, respectively, showed one complete viberation of approximately three eights of and inch in length. However there was not time for a detailed inspection. It is believed that the DSM team has inspected the hull for signs of loss of strength. The ship has been pretty badly battered by the various tugs that have had it under tow when alongside, or when reboarding parties or salvage parties were working on board.

S. Miscellaneous.

The starboard list of 3 or 4 degrees can be explained only partially by the diffrence in feed and fresh water in the tanks before and after the test. However, all the projectiles which were cast loose from the ready stowage have landed and remained on the starboard side of each stowage space.

PART C

TECHNICAL INSPECTION REPORT

SECTION II - MACHINERY

Because high radioactive contamination prevented detailed inspection of engineering equipment, spaces, etc., and because the forward and after engine rooms were flooding above the level of all the electric pumps, no attempt will be made to give other than a general discussion of damage noted. Each space will be dealt with separately.

Forward Fire Room:

In general this space received a tremendous shaking up. Floor plates and gratings have been displaced from foundations. Tool boxes and gear lockers have been thrown about. There has been no flooding of this space. The reach rod on the starboard feed check valve on #2 boiler is broken. The water level which was at about 3/4 high in the glass before the test has now gone out of sight. A burner was taken out and the brick works inspected. The back wall, side wall, and decks were intact. There were 5 or 6 bricks laying on the deck which evidently came from the front wall. There was no evidence of fractured lines of any kind in the fireroom. However, as most lines are lagged, subjecting the lines to test pressure is the only way to determine definately.

After Fire Room:

The boiler in this fire room had been secured and decommissioned since October 1945 because of its very poor material condition. The fireroom floor plates and gratings were thrown about as in the forward fireroom. The only damage noted is as follows: The reach rod to the root steam valve to the fuel oil service pump was fractured. The exhaust line between #2 fire and bilge pump and #2 emergency feed pump was leaking.

Auxiliary Stations:

There was no visible mechanical damage at any of the auxiliary stations, The diesel generator room was very heavily contaminated with radioactivity. There is about 1 inch of water on deck. It is believed this was the source of the contamination.

Forward Engine Room:

This space was flooded to level just below upper level floor plates. Floor plates were tossed about as in the fire rooms. The bulkhead and frame 104 was slightly dished in, port and starboard. One stanchion which supports the upper level gratings on the starboard side was bent slightly. The cooling water line to the lub oil cooler on #1 main circulating pump was nroken and is believed to be the main source of flooding of the forward engineroom. Sea valves to these lines are known to leak even though properly secured. There is no visible damage to pumps or turbines. All are believed to be securly on foundations. Main generators were securly on foundations. All steam and fresh water lines appeared to be intact. However only pressure will determine leaks. All lower level electrical motors were emersed in salt water and are considered to be grounded out. Numerous gages were broken.

After Engine Room:

This space was flooded to about 14" above the upper level floor plates. Frames 120 and 123 port side were bent inboard slightly at water line level. The outboard bulkhead (hull plating) was slightly dished in between frame 125 and 126, starboard side. There is a small leak near the water line at this location. This distortion and leak is believed to have been caused by tugs alongside. This engine-room showed the same evidence of a general shaking up. Floor plates were adrift from foundations. Gear lockers and tool boxes were thrown about. The gage glass on the fresh water test tank was broken. Several pressure gages on the evaporating plant were broken and lines to them carried away. The booster discharge gage on the Main Condensate and Booster Pump are torn loose from its mounting. The power panel near the port side at frame 118 has been pushed forward. The sounding cocks on the fresh water tanks had been jarred open and were leaking. The cooling water branch line to the stern tube was

broken at a 3/4" nipple. It is believed that this was the main source of flooding. Sea valves to these lines leak even though secured. The packing gland on the flapper valve of the main condenser was leaking. The packing gland on the main condenser overboard gate valve was leaking slightly. The stern tube packing gland on the starboard shaft was leaking slightly. After the space was pumped out, the fractured line was plugged with a wooden plug. The main condenser openings were closed. The main condenser was drained and the instrumentation removed from the condenser. As it was noted that the gate valves were not tight (even though closed with help of 24" stiltson) the main condenser was immediately closed up again. It is believed that all flooding has been stopped. Only normal seepage should be present now. All steam and fresh water lines appeared to be intact. All electric pumps are considered to be grounded out and inoperable. All machinery seems to be properly secured on foundations except #2 flushing pump which has the base bolts missing. It is not known whether the main condenser has had the boundary between the salt and fresh water ruptured. It is believed that when the ship has been completely decontaminated this should be determined. It is the ultimate determining factor (other than radioactivity) whether or not the vessel could have continued in action.

Soundings (Fuel Oil):

Tank	Contents	Before Test	After Test
A-2F	FO	7227	16890
A-3F	SW	9800	8349
A-4F	SW	9710	6042
A-5F	FO	20712	11215
A-6F	FO	12880	8330
A-7F	FO	12730	12730
A-8F	FO	0	4280
C-301F	Diesel	5592	Not Sounded
C-401F	Diesel	1735	Not Sounded
C-402F	"	1100	" "
C-1F	FO	1645	1591
C-6F	SW	4105	4207
C-7F	FO	3870	3770
C-8F	FO	9975	10823
C-9F	FO	9224	9506
C-10F	SW	7302	7302
B-301	Lub Oil	750	750
C-11F	SW	7318	7191

Soundings (Fresh Water):

TANK	BEFORE TEST	AFTER TEST
B-8	3090 Gal.	830 Gal.
B-10	1240 "	282 "
B-12	2900 "	435 "
B-13	2900 "	700 "
C-4	1235 "	1090 "
C-5	2360 "	1250 "
B-5	1010 "	725 "
B-6	660 "	1070 "

In all above discussions of continued operability, it has been assumed that the main steam lines are intact as there is no visible damage to them. However, testing them to pressure is the only way to determine definitely. If the main steam lines are fractured damage could not have been controlled and ship would have become immobilized in highly contaminated water.

PART C

TECHNICAL INSPECTION REPORT

SECTION III - ELECTRICAL

Because of the radiological contamination only a superficial inspection of electrical installation was possible. All electrical cables in the after engine room were submerged for a considerable period of time in salt water. This would have been prevented if damage control parties had been able to function. Submergence of motors would have been prevented also. In the area of the bridge electrical cable, many have been shorted out by shock damage or wave damage. Controllers and relays would have been knocked out. Whether or not they will still function is not known. Most lighting fixtures are still intact. The gyro compass case has been fractured in the I.C. Room. The glass cover has been smashed. Storage batteries, where ever they have been in mounts or stowages, have been cast adrift and acid spill. The Westinghouse Controller Panel for the forward engineroom vent supply has been broken in two and it is protruding from case. The 12" signal searchlight from the starboard wing of the bridge was broken loose and is lying on the main deck.

PART C

TECHNICAL INSPECTION REPORT

SECTION IV - ELECTRONICS

Very high radiological contamination prevented a detail inspection of electronic gear.

Radio: The radio room has all its receivers and transmitters on regular mounting. Transmitting tubes were not broken. No electrical tests were made. The master oscillator plate current meter glass on the TBL transmitter was shattered. The master oscillator thermometer on the TBK transmitter was broken. One folding desk was torn from brackets. The antenna system suffered the following damage: The common suspension type insulator which holds the TBK and TBL transmitter antenna to the main mast is broken. Two starboard receiving antenna are hanging loose. One of the wires holding a suspension type of insulation to the bridge is parted. On the other, the suspension type insulation holding antenna to the director deck is broken. In emergency radio the TBS remote control unit had top cover torn off and the entire unit torn from bulkhead brackets. The fuse and switch box between the TCS and batteries is torn from bulkhead and front cover completely torn open. The fuse holders inside are loose. One desk was torn from its mount in main radio room.

The C.I.C. the MN equipment was torn loose from mountings and is adrift. The MAN equipment has one unit off mountings and the AC power input switches were torn from mountings. The ABK Transponder has one unit completely adrift and is lying on deck, and the other loose from mountings. The RBH-1 receiver has one corner shock mounting completely torn away from receiver. The RBO which was mounted in the CPO mess room is adrift and on deck.

T[illegible]r Transmitting units are on their mountings and have no appar[illegible]mage. However the receiver indicator u[illegible]its has been covered [illegible] water. One tray of the SC unit is open and partially slid out. T[illegible]PI scopes do not appear to be broken. It is believed the water [illegible]e into combat via the voice tube when the ship was washed down [illegible]decontamination units. There is about 1" of water on the deck [illegible]combat. Loran and Sonar gear were not inspected.

SEC[illegible]F

Defense Special Weapons Agency
6801 Telegraph Road
Alexandria, Virginia 22310-3398

TRC

18 April 1997

MEMORANDUM FOR DEFENSE TECHNICAL INFORMATION CENTER
ATTENTION: OMI/Mr. William Bush (Security)

SUBJECT: Declassification of Reports

The Defense Special Weapons Agency has declassified the following reports:

AD-366588	XRD-203-Section 12
AD-366589	XRD-200-Section 9
AD-366590	XRD-204-Section 13
AD-366591	XRD-183
AD-366586	XRD-201-Section 10
AD-367487	XRD-131-Volume 2
AD-367516	XRD-143
AD-367493	XRD-142
AD-801410L	XRD-138
AD-376831L	XRD-83
AD-366759	XRD-80
AD-376830L	XRD-79
AD-376828L	XRD-76
AD-367464	XRD-106
AD-801404L	XRD-105-Volume 1
AD-367459	XRD-100

TRC

18 April 1997

Subject: Declassification of Reports

AD-801406L ✓ XRD-114.

In addition, all of the cited reports are now **approved for public release; distribution statement "A" now applies.**

Ardith Jarrett

ARDITH JARRETT
Chief, Technical Resource Center